

Randomized Trial of Magnesium Glycinate Supplementation and Blood Pressure in Middle-aged Adults

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Objective

- ❖ Hypertension is highly prevalent among middle-aged and older adults, and is a risk factor for major morbidity and mortality.
- ❖ Observational studies suggest that there is an inverse association between magnesium (Mg) intake and blood pressure (BP), however, results from clinical trials have been inconsistent.
- ❖ Mg glycinate, despite its potential as a more readily absorbed Mg formulation, has not been thoroughly investigated for its BP-lowering effects in the general population.
- ❖ We conducted a randomized, double-blind, placebo-controlled clinical trial to test the effects of Mg glycinate on 12-week changes in seated and 24-h ambulatory blood pressure (ABP) versus placebo.

Methods

- ❖ Adults aged 30-74 years with elevated BP or stage 1 hypertension (SBP 120-149 mmHg and/or DBP 80-94 mmHg), no past or current antihypertensive use, body mass index (BMI) < 40 kg/m², and no current Mg supplementation > 100 mg/day were eligible for the study.
- ❖ Participants were excluded if they had a history of cardiovascular disease, type 1 or 2 diabetes, renal disease, kidney failure, dialysis, pancreatitis, inflammatory bowel disease, or hypermagnesemia, an invasive cancer diagnosis in the past five years, or excessive antacid or laxative use in the past three months.
- ❖ We recruited participants from the greater Boston area through hospital recruitment tools, advertisements, fliers, and mailed postcards. Of 218 participants completing a pre-screening form, 158 were eligible and 97 completed a baseline clinic visit to provide baseline data, sign an informed consent, and if eligible, get randomized.
- ❖ A total of 59 participants (34 men and 25 women) were randomized to either 480 mg/day Mg glycinate supplementation or placebo for 12 weeks. Baseline characteristics were equally distributed by intervention group.
- ❖ At baseline, 6-week, and 12-week clinic visits, seated BP was measured with a sphygmomanometer, and 24-hr ABP was measured following each visit with a SPACELABS 90207 or 90217A monitor.
- ❖ Blood and urine samples, anthropometric measures, and questionnaires were also collected at each visit.

Table 1. Baseline characteristics after randomization to Mg glycinate (480 mg/day) or placebo

Baseline characteristics	Active Mg (n=30)	Placebo (n=29)	P value	Overall (n=59)
Age (years), mean ± SD	57.5 ± 8.5	56.9 ± 11.3	0.80	57.2 ± 9.9
Sex, No. (%)				
Male	16 (53.3)	18 (62.1)	0.68	34 (57.6)
Female	14 (46.67)	11 (37.9)		25 (42.4)
Race/ethnicity, No. (%)				
White	24 (80.0)	27 (93.1)	0.28	51 (86.4)
Non-White	6 (20.0)	2 (6.9)		8 (13.6)
Body mass index (kg/m ²), mean ± SD	27.7 ± 5.1	28.2 ± 4.4	0.65	27.9 ± 4.7
Exercise (kcal/wk), mean ± SD	1171 ± 991	1116 ± 829	0.82	1144 ± 907
Blood pressure				
Seated systolic BP (mmHg), mean ± SD	132.9 ± 9.1	133.9 ± 7.7	0.67	133.4 ± 8.4
Seated diastolic BP (mmHg), mean ± SD	83.2 ± 6.4	81.9 ± 6.1	0.41	82.6 ± 6.2
24-hour systolic BP (mmHg), mean ± SD	128.8 ± 9.6	130.0 ± 8.9	0.61	129.4 ± 9.2
24-hour diastolic BP (mmHg), mean ± SD	78.6 ± 6.6	78.5 ± 5.3	0.91	78.6 ± 5.9

Results

Figure 1. Change in average seated systolic blood pressure among Mg glycinate and placebo groups.

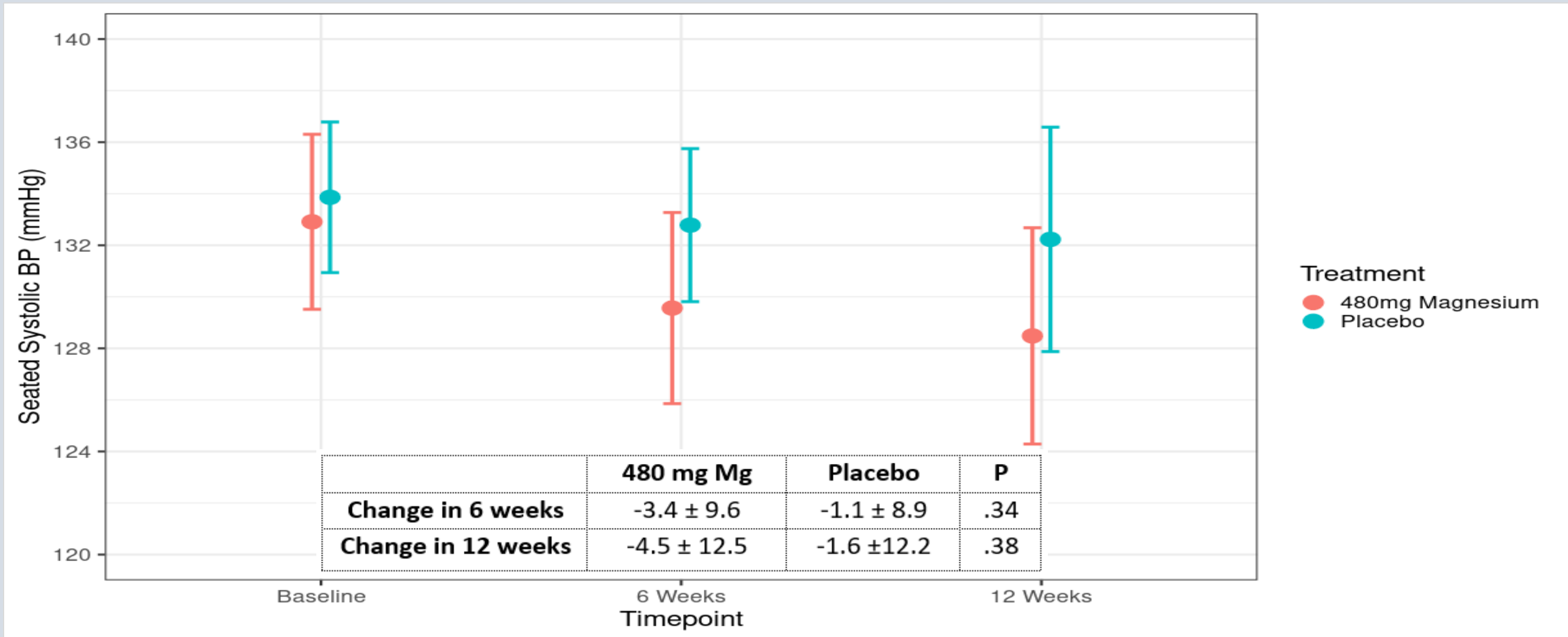


Figure 2. Change in average seated diastolic blood pressure among Mg glycinate and placebo groups.

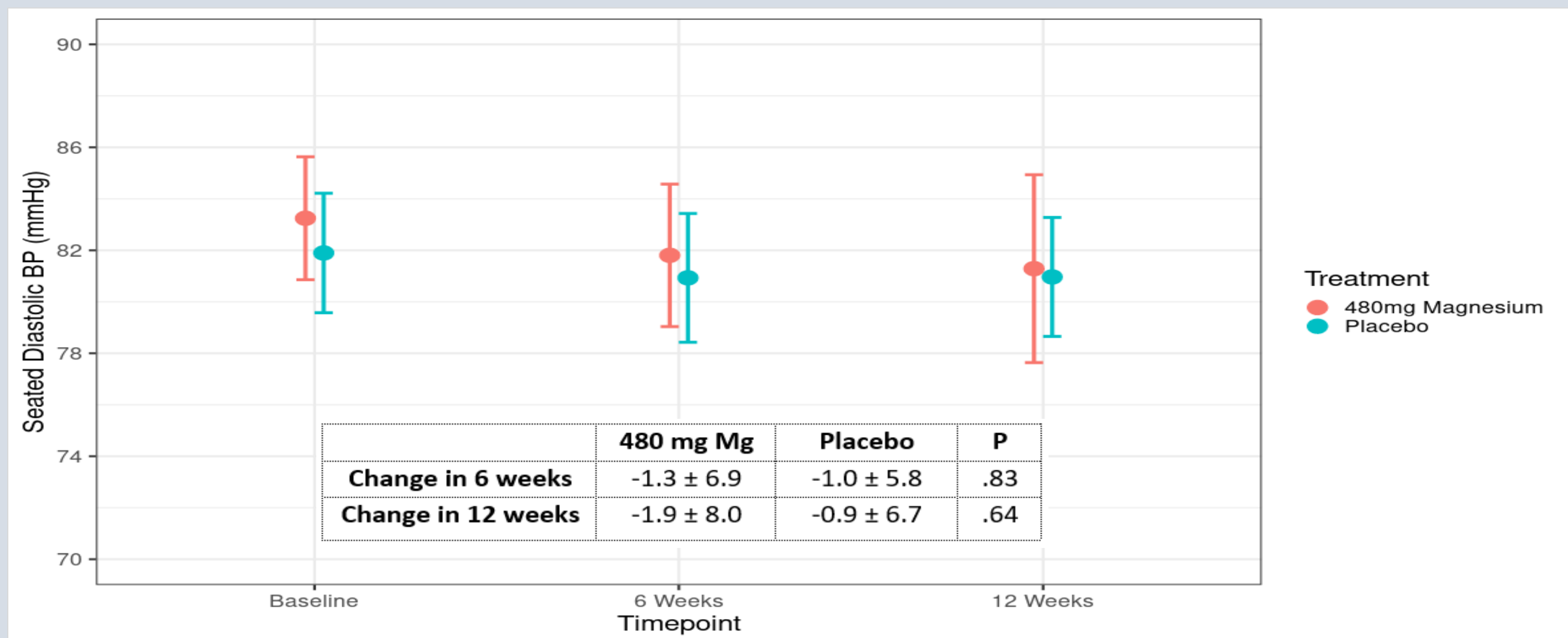


Figure 3. Change in average 24-hr ambulatory systolic blood pressure among Mg glycinate and placebo groups.

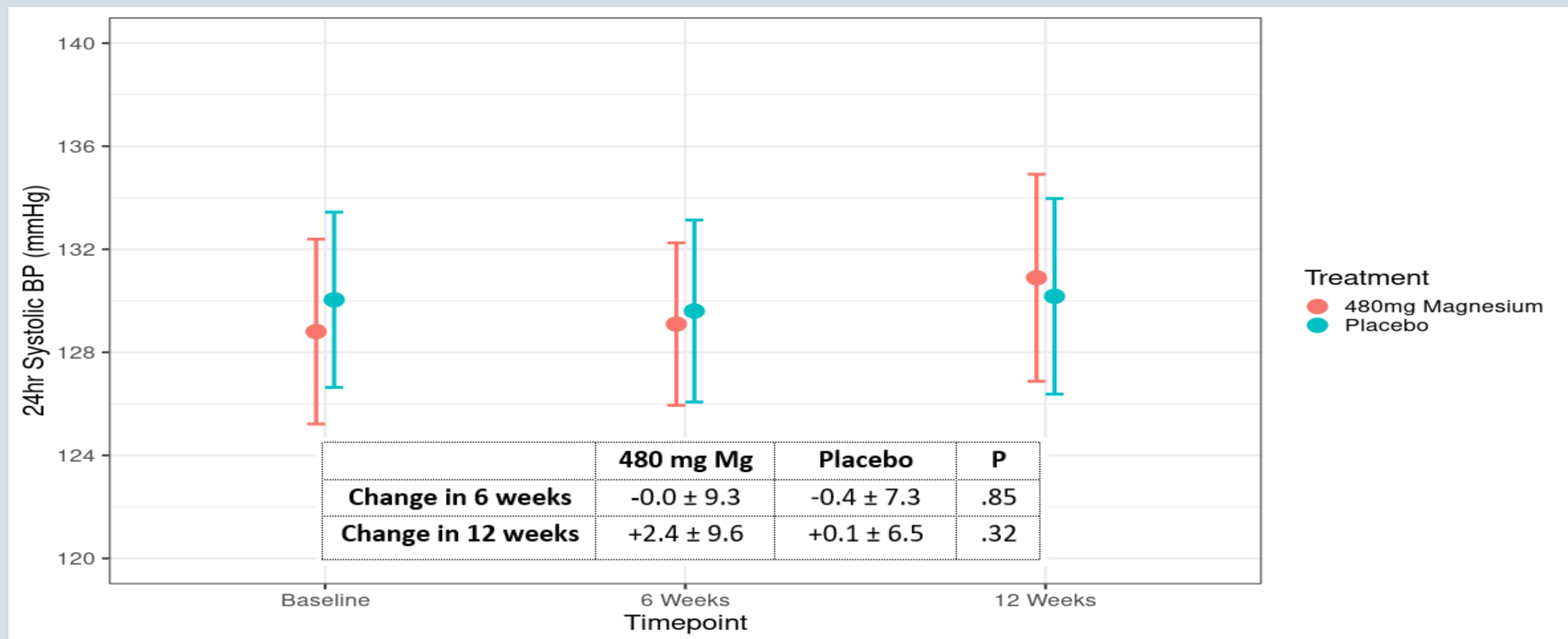


Figure 4. Change in average 24-hr ambulatory diastolic blood pressure among Mg glycinate and placebo groups.

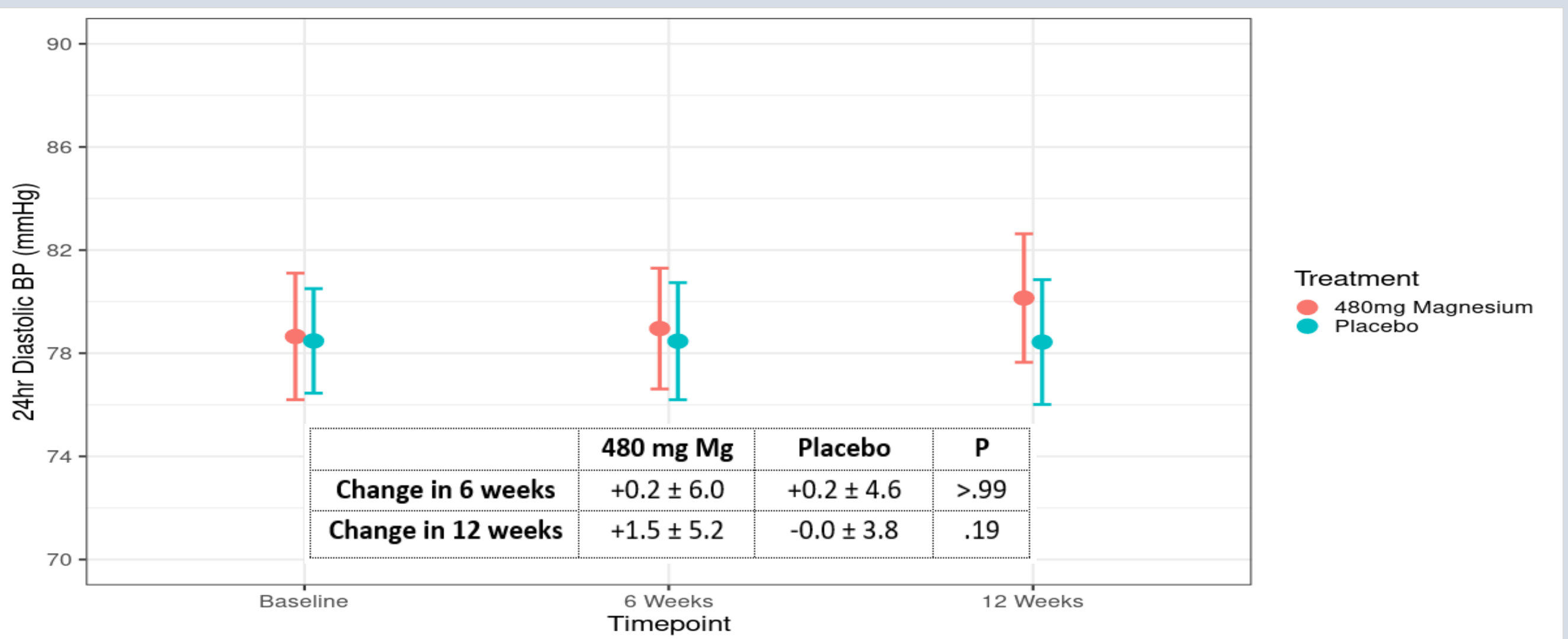


Table 2. Effect modification by selected baseline characteristics for Mg glycinate vs. placebo on the difference in mean seated systolic and diastolic blood pressure

	Change in 12-week seated SBP			Change in 12-week seated DBP		
	Magnesium			Magnesium		
Baseline Characteristic	Active (n=28)	Placebo (n=28)	P value†	Active (n=28)	Placebo (n=28)	P value†
Sex						
Women	-9.7 ± 10.1	-3.1 ± 16.1	.26	-4.8 ± 5.4	-2.4 ± 6.2	.31
Men	-0.4 ± 13.1	-0.7 ± 9.5	.93	-0.4 ± 9.1	-0.0 ± 7.1	.93
P, interaction			.29			.43
Seated SBP						
<130 mmHg	2.3 ± 9.5	1.1 ± 8.1	.77	-0.4 ± 7.9	+0.8 ± 5.3	.68
≥130 mmHg	-9.3 ± 12.4	-2.7 ± 13.5	.12	-2.8 ± 8.1	-1.6 ± 7.2	.62
P, interaction			.24			>.99
Seated DBP						
<85 mmHg	-2.7 ± 9.0	+1.0 ± 11.4	.28	-0.7 ± 6.5	+0.7 ± 5.8	.48
≥85 mmHg	-7.5 ± 17.0	-7.4 ± 12.7	.98	-3.7 ± 10.1	-4.6 ± 7.6	.82
P, interaction			.61			.56

- ❖ After 12 weeks, there were no significant differences for changes in seated SBP or DBP and changes in daytime, nighttime, or overall 24-h SBP or DBP comparing 480 mg/day Mg glycinate versus placebo.
- ❖ In subgroup analyses, women and those with greater baseline seated SBP (≥130 mmHg) and DBP (≥85 mmHg) taking 480 mg/d Mg glycinate had suggestive but non-significant 12-week reductions in seated SBP compared with placebo.

Limitations

- ❖ The small sample size of the trial limited our ability to evaluate and detect more modest BP lowering effects for Mg glycinate.
- ❖ We tested the same 480 mg/day dose of Mg glycinate in men and women, although daily Mg intake recommendations are 100 mg higher in men.
- ❖ We have yet to incorporate serum and dietary Mg into our trial results; these data are forthcoming.

Conclusions

- ❖ Our study showed that Mg glycinate supplementation does not significantly lower BP in adults with elevated, untreated BP.
- ❖ However, Mg glycinate may modestly reduce seated BP, especially in participants with baseline SBP ≥130 mmHg, baseline DBP ≥ 85 mmHg, and women.
- ❖ A larger trial targeting these groups would be well positioned and powered to evaluate the effects of Mg glycinate.
- ❖ Upcoming analyses of serum and dietary Mg levels will also provide important context surrounding the effects of Mg glycinate on BP changes.

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