Impact of bowel preparation for colonoscopy on serum electrolytes: polyethylene glycol-electrolyte solution versus sodium phosphate

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Background

Polyethylene glycol-electrolyte solution (PEG) and sodium phosphate (NaP) are the two representatives used for bowel cleansing prior to colonoscopy. Because of the possibility of acute phosphate nephropathy, NaP has largely been replaced by PEG. However, large-scaled controlled studies are required to demonstrate whether no significant serum electrolyte disturbances are induced by PEG.

Methods

Fasting serum data were collected from the adults who had regular checkups at Hanyang University Hospital in 2011. According to the use of bowel preparation solution, the subjects were grouped into PEG (n=2593), NaP (n=826), and controls (non-users, n=3839). Those with eGFR < 60 mL/min/1.73 m^2 were excluded. Differences among the groups were analyzed using the one-way ANOVA and Scheffé post hoc test.

Study flowchart
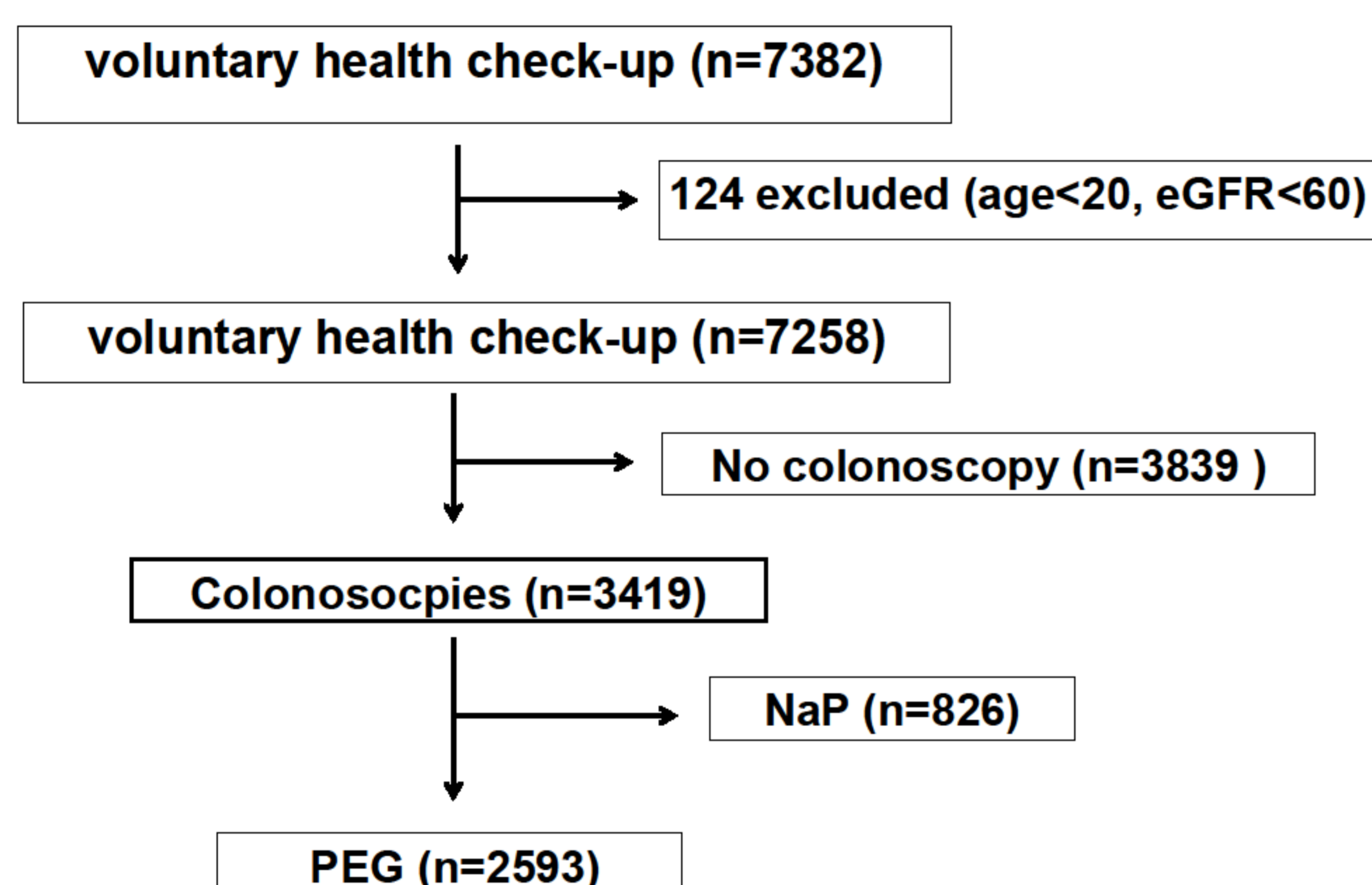
Demographic features

	None (n = 3839)	NaP (n = 826)	PEG (n = 2593)	P
Male/Female	1844/1995	429/397	1444/1149	<0.0001*
Mean Age (yr)	43 ± 10	50 ± 10‡	48 ± 10‡§	<0.0001†

PEG, Plyethylene glycol; NaP, Sodium phosphate
*, by chi square test; †, by Kruskal-Wallis test.
‡, P<0.0001 vs. None (by Mann-Whitney U test)
§, P<0.0001 vs. NaP (by Mann-Whitney U test)

Results

Serum electrolyte concentrations after bowel preparation

	None (n = 3839)	NaP (n = 826)	PEG (n = 2593)	P*
Sodium	140.3 ± 1.9	141.3 ± 2.7†	141.0 ± 2.2†‡	<0.0001
Potassium	4.18 ± 0.34	3.80 ± 0.38†	4.16 ± 0.35‡	<0.0001
Chloride	103.1 ± 2.0§	104.0 ± 2.7†	102.8 ± 2.3†‡	<0.0001
Calcium	9.22 ± 0.35	8.74 ± 0.44†	9.24 ± 0.39‡	<0.0001
Phosphate	3.45 ± 0.48	6.71 ± 1.79†	3.45 ± 0.59‡	<0.0001

*, by Scheffé post hoc test
†, P<0.05 vs. None (by one-way ANOVA)
‡, P<0.05 vs. NaP (by one-way ANOVA)

Incidence of dysnatremia

(mEq/L)	None (n = 3395)	NaP (n = 797)	PEG (n = 2384)
<135	8 (0.2%)	9 (1.1%)	11 (0.5%)
135-145	3372 (99.3%)	747 (93.7%)	2334 (97.9%)
>145	15 (0.5%)	41 (5.2%)	39 (1.6%)

Serum sodium levels were significantly associated with bowel preparation agents (P<0.0001)

Incidence of dyskalemia

(mEq/L)	None (n = 3395)	NaP (n = 797)	PEG (n = 2384)
<3.5	22 (0.7%)	137 (17.2%)	30 (1.3%)
3.5-5.0	3326 (98.0%)	656 (82.3%)	2323 (97.4%)
>5.0	47 (1.3%)	4 (0.5%)	31 (1.3%)

Serum potassium levels were significantly associated with bowel preparation agents (P<0.0001)

Incidence of dyscalcemia

(mg/dL)	None (n = 3839)	NaP (n = 826)	PEG (n = 2593)
<8.4	28 (0.7%)	140 (17.0%)	42 (1.6%)
8.4-10.4	3800 (99.0%)	686 (83.0%)	2546 (98.2%)
>10.4	11 (0.3%)	0 (0%)	5 (0.2%)

Serum calcium levels were significantly associated with bowel preparation agents (P<0.0001)

Incidence of dysphosphatemia

(mq/dL)	None (n = 3839)	NaP (n = 826)	PEG (n = 2593)
<2.5	64 (1.7%)	0 (0%)	47 (1.8%)
2.5-4.5	3730 (97.2%)	94 (11.4%)	2483 (95.8%)
>4.5	45 (1.1%)	732 (88.6%)	63 (2.4%)

Serum phosphate levels were significantly associated with bowel preparation agents (P<0.0001)

Conclusion

Elevation of serum sodium concentration is induced by PEG. In contrast to NaP, PEG induces no significant disturbances in serum potassium, calcium and phosphorus.