

# EFFICACY OF TWO LITRES POLYETHYLENE GLYCOL VERSUS FOUR LITRE POLYETHYLENE GLYCOL SOLUTION FOR BOWEL CLEANSING FOR COLONOSCOPY

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## ABSTRACT

**Objectives:** To compare the efficacy of two liter polyethylene glycol with four liter polyethylene glycol solution for bowel cleansing for colonoscopy.

**Material & Methods:** This study was conducted in the Department of Gastroenterology, MTI, Lady Reading Hospital, Peshawar, Pakistan comprising of 458 patients. These patients were randomized to 2 groups A and B by lottery method so that each group contains 229 patients. Group A received 2 liters of PEG solution for bowel cleansing while group B received 4 liters of PEG solution. Patient's bowel preparation was evaluated to Boston Bowel preparation score by experienced endoscopists who would not know the regimen used for bowel cleansing.

**Results:** Our study shows that in group A mean age was 34 years  $\pm$  11.273 SD while in Group B mean age was 32 years  $\pm$  10.182 SD. In Group A 42% patients were male and 58% patients were female. Where as in Group B 45% patients were male and 55% patients were female. Two liter polyethylene glycol was effective in 80% patients while four liter polyethylene glycol solution was effective in 85% patients.

**Conclusion:** There is no significant difference in two liter Polyethylene Glycol solution and 4 liter solution. Hence two liter Polyethylene Glycol solution can be used for the for bowel cleansing for colonoscopy instead of 4 liter solution.

**Key Words:** Polyethylene glycol, colonoscopy, bowel cleansing.

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**This article may be cited as:** Khattak AK, Ahmad S, Hassan MK, Khan H, Masood A, Ahmad M. Efficacy of two litres polyethylene glycol versus four litre polyethylene glycol solution for bowel cleansing for colonoscopy. *J Med Sci* 2017; 25: (2) 76-79.

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## INTRODUCTION

Colonoscopy is the standard method for evaluating the colon. Recent surveys have shown that the proportion of individuals aged 50 years or older who have undergone colonoscopy within the last 10 years is currently ranging from 6%-25% in Europe to 62% in the United States of America.<sup>1</sup> Adequate bowel cleansing is prerequisite for optimal endoscopic visualization and affects the safety, efficacy, diagnostic accuracy and quality of colonoscopy. Inadequate bowel cleansing

results in prolonged procedure time, missed lesions (polyps and colorectal cancer) and need for repeat procedures.<sup>2</sup> Gastrointestinal societies have proposed the use of various quality assessment indicators, such as the rates of adenoma detection and caecal intubation.<sup>3</sup> Adenoma detection rate is recognized to be decreased by poor bowel preparation.<sup>4</sup> In a study conducted on Asian patients, poor bowel preparation resulted in decreased caecal intubation, prolonged caecal intubation and total colonoscopy time, and increased patient discomfort.<sup>5</sup> Recent studies in Europe and Australia reported that poorly prepared patients during colonoscopy had longer, more difficult procedures and a lower diagnostic yield for polyps.<sup>4</sup> The ideal method of colon cleansing should be fast, safe and get a proper cleaning with minimal discomfort for the patient.<sup>6</sup> Adequate colon preparation depends partly on both correct choice of cleaning product and dietary restriction.<sup>5</sup> The most widely used regimes are based on either polyethylene glycol-electrolyte (PEG) lavage

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**Date Received:** June 25, 2016

**Date Revised:** December 12, 2016

**Date Accepted:** February 10, 2017

solution or aqueous sodium phosphate solution.<sup>4</sup> Introduced in 1980, polyethylene glycol (PEG) is an orally administered isotonic non-digestible and non-absorbable solution which cleanses the colon by washout of intraluminal contents. The efficacy of standard 4-L PEG is compromised by poor patient compliance. The large volume and taste are the main factors that contribute to poor patient compliance and tolerability which led to development of reduced PEG volume solutions with or without laxatives and flavored PEG solutions in an order to reduce the sulphate odor and to the improve taste<sup>7</sup>. A recently conducted international study compared 2 liter PEG with 4 liter PEG reported an excellent-good level cleansing in 84.6% of patients who received 2-L PEG + ascorbic acid and 75.3% of patients who received 4-L PEG.<sup>8</sup>

In this study we intend to compare the efficacy of 2 L PEG solution with 4 L PEG solution for bowel cleansing for colonoscopy in local population. The knowledge of better tolerated and efficacious bowel cleansing regimen will enable us to successfully cleanse bowel and achieve quality indicators of colonoscopy with less hazards to the patient. Moreover, No such study has been conducted in local population yet.

**MATERIAL AND METHODS**

This study was a single center double blinded randomized controlled trial. Duration of the study was from June 2015 to June 2016. Sample size was taken according to WHO guide lines. Software with 95% confidence interval and 5% margin of error. Patients were divided in two groups by lottery method. Each group contained 229 patients and bowel cleansing was assessed by well experienced endoscopists. Efficacy was evaluated per colonic segment (right, transverse, and left colon) on a 4-point scale (0-3) according to the Boston Bowel Preparation scale (BBPS). Overall cleansing of the colon was scored by summing up the scores of each segment. For the study, the total score ranging from 0 to 9 was divided into two different classes: excellent-good cleansing (total score 6-9) and poor-inadequate inadequate cleansing (0-5). Boston Bowel preparation scale 6-9 (good-excellent) was consider as efficacy achieved in particular patient for both the groups. The purpose and benefits of study were explained to patients and written consent for participation in study was obtained after approval from ethical committee.

Data was analyzed by using Statistical Package for Social Sciences (SPSS) version 19.0. Mean

+ standard deviation was calculated for continuous variables like age of patients and Boston Bowel Preparation Scores. Frequency and percentages were calculated for qualitative variables like gender and efficacy. Efficacy was stratified among age, gender and indication for colonoscopy to see effect modification. Post stratification Chi-square test was also be applied taking p-value as significant. Efficacy was compared between both groups using Chi-Square Test keeping p-value was significant. Results were presented as tables and graphs.

**RESULTS**

A total of 229 patients (in each group) were observed to compare the efficacy of two liter polyethylene glycol with four liter polyethylene glycol solution for bowel cleansing for colonoscopy and the results were analyzed as:

Boston bowel preparation scale among two groups was analyzed as in Group A 183(80%) patients had Boston bowel preparation scale range 6-9 and 46(20%) patients had Boston bowel preparation scale range 0-5. Mean Boston bowel preparation scale range  $7 \pm 2.73$  SD. Where as in Group B 195(85%) patients had Boston bowel preparation scale range 6-9 and 34(15%) patients had Boston bowel preparation scale range 0-5. Mean Boston bowel preparation scale range  $8 \pm 2.91$  SD, as shown in Table 1. Efficacy among two groups was analyzed as Group A was effective in 183(80%) patients and was not effective in 46(20%) patients. Where as Group B was effective in 195(85%) patients and was not effective in 34(15%) patients, as shown in Table 2. Stratification of efficacy with age, gender and duration of illness is given in Table 3,4 respectively.

**Table 1: Boston bowel preparation scale**

Boston bowel preparation scale	Group A	Group B
Excellent-Good BBPS score (6-9)	183(80%)	195(85%)
Fair-Poor BBPS score (0-5)	46(20%)	34(15%)
Total	229(100%)	229(100%)
Mean and SD	$7 \pm 2.73$	$8 \pm 2.91$

**Table 2: Efficacy of PEG in bowel cleansing**

Efficacy	Group A	Group B
Effective	183(80%)	195(85%)
Not effective	46(20%)	34(15%)
Total	229(100%)	229(100%)

**Table 3: Stratification of efficacy with age**

Age in years	Efficacy	Group A	Group B	P value
18-30	Effective	61	68	0.4344
	Not effective	15	12	
Total		76	80	
31-40	Effective	70	76	0.3842
	Not effective	17	13	
Total		87	89	
41-50	Effective	38	39	0.479
	Not effective	10	7	
Total		48	46	
51-60	Effective	14	12	0.5683
	Not effective	4	2	
Total		18	14	

**Table 4: Stratification of efficacy with gender**

Gender	Efficacy	Group A	Group B	P value
Male	Effective	77	88	0.4344
	Not effective	19	15	
Total		96	103	
Female	Effective	106	107	0.3842
	Not effective	27	19	
Total		133	126	

**DISCUSSION**

Colonoscopy is the standard method for evaluating the colon. Recent surveys have shown that the proportion of individuals aged 50 years or older who have undergone colonoscopy within the last 10 years is currently ranging from 6%-25% in Europe to 62% in the United States of America. Adequate bowel cleansing is prerequisite for optimal endoscopic visualization and affects the safety, efficacy, diagnostic accuracy and quality of colonoscopy. Inadequate bowel cleansing results in prolonged procedure time, missed lesions (polyps and colorectal cancer) and need for repeat procedures.<sup>9</sup> Gastro-intestinal societies have proposed the use of various quality assessment indicators, such as the rates of adenoma detection and caecal intubation. Adenoma detection rate is recognized to be decreased by poor bowel preparation. In a study conducted on Asian patients, poor bowel preparation resulted in decreased

caecal intubation, prolonged caecal intubation and total colonoscopy time, and increased patient discomfort<sup>10</sup>. Recent studies in Europe and Australia reported that poorly prepared patients during colonoscopy had longer, more difficult procedures and a lower diagnostic yield for polyps.<sup>11-18</sup>

Our study shows that in Group A mean age was 34 years with SD ± 11.273 while in Group B mean age was 32 years with SD ± 10.182. In Group A 42% patients were male and 58% patients were female. Where as in Group B 45% patients were male and 55% patients were female. Two liter polyethylene glycol was effective in 80% patients while four liter polyethylene glycol solution was effective in 85% patients.

Kelly NM et al<sup>19</sup> had shown that in which a total of 258 (female, 138; 53.5%) patients were recruited, 91 in the Klean Prep group (F: 45, 49.5%), 86 patients in the Movi prep group (female, 45; 52.3%), and 81 in the Senna/Citramag group (female, 44; 54.3%). Significantly more patients were unable to take the prescribed dose of Klean Prep when compared with the other 2 regimes (19.6%; P<0.0001 vs. Movi prep; P<0.0001 vs. Senna/Citramag). A total of 45.65% of patients reported Klean Prep as tasting unpleasant. This was significantly more than both Movi prep (10.47%; P=0.008) and Senna/Citramag (9.88%; P<0.0001). The overall cleansing efficacy across the 3 groups (those with grades A or B) was 73.9%, 74.5%, and 86.5% for Klean Prep, Movi Prep, and Senna/Citramag, respectively. In this series Senna/Citramag proved significantly better at bowel cleansing than Klean Prep (P<0.05) and it showed a trend toward better cleansing when compared with Movi prep (P=0.08).

Poon CM et al<sup>20</sup> had shown that two hundred patients were included in this randomized trial. Nine patients were excluded, due to either an incomplete questionnaire (two in the PEG-EL group, one in the Na P group) or inability to complete the bowel preparation regimen (four in the PEG-EL group and two in the Na P group). The demographic data were comparable in the two groups. There were no differences between the two groups with regard to willingness to repeat the regimen, ease of consumption, acceptability of the bowel preparation regimen, or the endoscopists' satisfaction with the quality of bowel preparation. The Na P group had a better mean endoscopic score at the cecum compared with the PEG-EL group (1.47 ± 1.15 vs. 1.05 ± 0.76; P = 0.007).

**CONCLUSION**

There is no significant difference in two liter Polyethylene Glycol solution and 4 liter solution. Hence two liter Polyethylene Glycol solution can be used for the bowel cleansing for the colonoscopy instead of 4 liter solution.

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**CONFLICT OF INTEREST:** Authors declare no conflict of interest

**GRANT SUPPORT AND FINANCIAL DISCLOSURE** NIL

### **AUTHOR'S CONTRIBUTION**

Following authors have made substantial contributions to the manuscript as under:

- Khattak AK:** Main idea.  
**Ahmad S:** Data collection  
**Hassan MK:** Literature search  
**Khan H:** Bibliography  
**Masood A:** Follow-up  
**Ahmad M:** Follow-up

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.