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% to 25% in Europe to 62% in the United States of America. Adequate bowel cleansing is a 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. Gastrointestinal societies have proposed the use of various quality assessment indicators, such as the rates of adenoma detection and caecal intubation. Adequacy of bowel preparation is recognized to be decreased by poor bowel preparation. In a study conducted on Asian patients, poor bowel preparation resulted in longer, more difficult procedures and a lower diagnostic yield for polyps. The ideal method of colon cleansing should be fast, safe and get a proper cleaning with minimal discomfort for the patient. Adequate colon preparation depends partly on both correct choice of cleaning product and dietary restriction. The most widely used regimes are based on either polyethylene glycol-electrolyte (PEG) lavage.
Efficacy of two litres polyethylene glycol versus four litre polyethylene..."...

Introduction 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. 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.

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 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 ± 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 ± 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>
<thead>
<tr>
<th>Boston bowel preparation scale</th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent-Good BBPS score (6-9)</td>
<td>183(80%)</td>
<td>195(85%)</td>
</tr>
<tr>
<td>Fair-Poor BBPS score (0-5)</td>
<td>46(20%)</td>
<td>34(15%)</td>
</tr>
<tr>
<td>Total</td>
<td>229(100%)</td>
<td>229(100%)</td>
</tr>
<tr>
<td>Mean and SD</td>
<td>7 ± 2.73</td>
<td>8 ± 2.91</td>
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</table>

<table>
<thead>
<tr>
<th>Efficacy of PEG in bowel cleansing</th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective</td>
<td>183(80%)</td>
<td>195(85%)</td>
</tr>
<tr>
<td>Not effective</td>
<td>46(20%)</td>
<td>34(15%)</td>
</tr>
<tr>
<td>Total</td>
<td>229(100%)</td>
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</tr>
</tbody>
</table>
Efficacy of two litres polyethylene glycol versus four litre polyethylene..........

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. 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. 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.

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 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 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.

REFERENCES

1. Goldberg RM, Sargent DJ, Morton RF. A randomized controlled trial of fluorouracil plus leucovorin, irinotecan, and oxaliplatin combinations in patients with
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CONFLICT OF INTEREST: Authors declare no conflict of interest

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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.