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# Adding pineapple juice to sennoside A+B calcium for colonoscopy bowel preparation

## Kolonoskopi öncesi barsak temizliği için sennosid A+B kalsiyum hazırlık rejimine ananas suyu eklenmesi

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***Background and Aims:*** *The diagnostic efficacy of colonoscopy depends on the quality of bowel preparation. It was shown in one study that administration of pineapple juice to 2 liter polyethylene glycol improves the quality of bowel cleaning. The aim of this study is to assess the effect of adding pineapple juice to sennoside A+B calcium for colon cleansing.* ***Materials and Methods:*** *One hundred patients admitted to our unit for elective colonoscopy were randomized to control group and pineapple group. Patients were advised to use 300 mg sennoside A+B calcium. In addition to this, the patients in the pineapple group were advised to squeeze one pineapple via a fruit juice extractor, and to drink it at the preprocedural day. The endoscopist scored the cleaning of the colonic segments using the Ottawa Bowel Preparation Scale* ***Results:*** *After exclusion 46 patients in the control group and 44 patients in the pineapple group were included in the analysis. The cleanliness for each segments of the colon and the total OBPS was not statistically significant between groups. The total OBPS for pineapple group and control group were 4.77 and 5.00, respectively.* ***Conclusion:*** *Adding fresh squeezed pineapple juice has no beneficial effect on increasing colon cleansing.*

***Key words:*** *Bowel preparation, bromelain, colonoscopy, pineapple juice, sennoside A+B calcium*

***Giriş ve Amaç:*** *Kolonoskopinin tanısal etkinliği barsak hazırlığı rejiminin başarısına bağlıdır. Daha önce yapılan bir çalışmada polietilen glikol kolonoskopi hazırlık rejimine ananas suyu eklenmesinin barsak temizliğini artırdığı gösterilmiştir. Bu çalışmanın amacı sennosid A+B kalsiyum hazırlık rejimine ananas suyu eklemenin barsak temizliği üzerine olumlu etkisinin olup olmadığının değerlendirilmesidir.* ***Gereç ve Yöntem:*** *Kolonoskopi yapılmak üzere ünitemize yönlendirilen hastalar randevu verilmesi esnasında ananas grubu ve kontrol grubu olarak iki gruba ayrıldı. Tüm hastalara barsak hazırlığı için işlemden bir gün önce sennosid A+B kalsiyum 300 mg, bol su ile içmeleri önerildi. Ananas grubunda yer alan hastalara ise buna ek olarak işlemden bir gün önce bir tam ananası katı meyve sıkacağından geçirerek içmesi önerildi. İşlemi yapan endoskopist barsak temizliğini Ottawa barsak temizliği skalası yardımı ile değerlendirdi ve sonuçlar karşılaştırıldı.* ***Bulgular:*** *Çalışma için uygun olmayan hastalar dışlandıktan sonra kontrol grubunda 46, ananas grubunda ise 44 hasta değerlendirmeye alındı. Total Ottawa barsak temizliği skalası skoru ve her kolon segmenti için ayrı ayrı hesaplanan temizlik miktarları açısından iki grup arasında istatistiksel olarak anlamlı fark saptanmadı. Total Ottawa barsak temizliği skalası ananas grubu ve kontrol grubu için sırasıyla 4,77 ve 5,00 olarak hesaplandı.* ***Sonuç:*** *Sennosid A+B kalsiyum hazırlık rejimine ananas suyu eklemenin barsak temizliği üzerine olumlu katkısı saptanamamıştır.*

***Anahtar kelimeler:*** *Ananas suyu, barsak temizliği, bromelain, kolonoskopi, sennoside A+B calcium*

## INTRODUCTION

Colonoscopy is the gold standard method to detect colonic disorders, especially colorectal carcinoma and adenomatous polyps. The diagnostic efficacy of colonoscopy depends on the quality of bowel preparation, and pathologic lesions may be missed due to inadequate cleansing (1-3). Cleansing quality determines quality, difficulty, speed, and completeness of colonoscopy (1). The detection rate of polyps of any size is also increased with effective cleansing (1,4).

Polyethylene glycol (PEG)-based solutions and Sodium phosphate (NaP) are widely used cleansing solutions for colonoscopy preparation. The European Society of Gastrointestinal Endoscopy (ESGE) guideline recommends a split regimen of 4 L PEG solution, and advices against the use of oral NaP for bowel preparation, because of safety concerns (5). The more common complications seen after NaP include acute renal failure, hyperphosphataemia, hypocalcaemia, hypokalaemia, and hyper- or hyponatraemia (5,6). Sennoside A+B calcium can also be used for colon cleansing. Its efficacy in bowel cleansing has not been studied widely, but in few studies sennoside A+B calcium was as effective as NaP (7-9).

Pineapple juice contains a proteolytic enzyme, called bromelain (10). Pineapple juice drinking has been shown to be effective in the dissolution of undigested food in the stomach and for phytobezoars leading to small bowel obstruction (10-12). It was shown that administration of pineapple juice to 2 liter PEG preparation regime improves the quality of bowel cleaning (13).

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At the time this study was performed PEG was not available in Turkey due to reimbursement policies, and NaP is not recommended for its frequently seen complications. Therefore we use high dose sennoside A+B calcium for routine colon cleansing at our colonoscopy unit. The aim of this study is to assess the effect of adding pineapple juice to sennoside A+B calcium for colon cleansing.

## MATERIALS and METHODS

The study included patients who were admitted to our gastroenterology department at Ankara Atatürk Education and Research Hospital for elective colonoscopy between April 2014 and September 2014.

One hundred patients were randomized to either the pineapple or control group at the time of appointment for colonoscopy (n=50 each). All patients were advised to eat a low-fiber diet and increase water intake for three days before the procedure. They were advised to take sennoside A+B calcium tablet (X-M tablet®, Yenişehir, Turkey) 40 mg in two divided doses for the last 5 days prior colonoscopy. They ingested 150mL (300 mg) sennoside A+B calcium solution (X-M diyet solusyon®, Yenişehir, Turkey) between 19 and 22 pm the day before colonoscopy. In addition to this preparation regimen the patients in the pineapple group were advised to squeeze one pineapple via a fruit juice extractor, and to drink it at the preprocedural day. Eligible patients were aged 18 or older with no known colon diseases (inflammatory bowel disease, colorectal malignancy or infectious colitis) or prior bowel surgery. Patients were excluded from the study if they had experience for colonoscopy with inadequate cleansing. Patients whose colonoscopy could not be completed because of stenosing colorectal cancer or patient intolerance were also excluded from the study. All of the patients included in the study filled out a questionnaire about the preparation regimen. Patients who were not able to finish the whole regime were excluded from the study either.

Colonoscopies were performed by the same endoscopist who was blind to the type of precolonoscopic preparation regime prescribed. The endoscopist or the gastroenterology nurses recorded demographic and clinical data: age, sex, height, weight, body mass index, indication to the examination and the experience of prior colonoscopy. Procedures were carried out without conscious sedation, using Olympus video-endoscopes (GIF type-160 and 180).

The endoscopist scored the cleaning of the colonic segments using the Ottawa Bowel Preparation Scale (OBPS) [14]. OBPS assesses cleanliness and fluid volume separately. Cleanliness was assessed with a score from 0 to 4 for the right colon (caecum, ascending colon), the mid colon (transverse and descending colon), and the rectosigmoid region separately. For each colon segment; if the preparation is perfect, a score of 0; if the mucosa is able to see without aspiration, a score of 1; if it is necessary to suction liquid stool to adequately see the colonic wall, a score of 2 and if it is necessary to wash and to suction, a score of 3 is given. Solid stool which is incapable of aspiration deserves a score of 4. Fluid volume quantity was graded from 0 to 2 for the whole colon. The score was calculated by adding the 0 to 4 ratings for each colon segment and the 0 to 2 fluid quantity rating, so the OBPS has a range from 0 to 14 [14]. The cleanliness for each colon segment and the total OBPS was compared between groups. Bowel preparation was considered inadequate if the OBPS was ≥6.

All study participants signed a written informed consent and The Medical Ethics Committee of Yildirim Beyazit University, Faculty of Medicine at Ankara approved the study design and methods.

All statistical analyses were performed with the SPSS 20.0 software. The cut-off value for statistical significance was accepted as <0.05. Independent Samples T-Test was used to determine the differences in variables.

## RESULTS

Among 50 patients in the control group 2 patients were excluded because they were not able to finish the whole regime, and 2 patients were excluded because of incomplete colonoscopy due to patient intolerance and stenosing colorectal cancer. Three patients in the pineapple group were excluded because of inadequate use of cleaning regimen and 3 patients were excluded for incomplete colonoscopy due to patient intolerance. The tolerability of bowel preparation regimen was rated inadequate in 2 of 50 (4%) and 3 of 50 (6%) patients in the control and pineapple group, respectively. After exclusion 46 patients in the control group and 44 patients in the pineapple group were included in the analysis.

The baseline demographic features of the patients were similar between groups. Prior experience for colonoscopy, the frequency of patient complaining about constipation, and the existence of previously diagnosed diabetes mellitus were also similar for each group (Table 1).

The cleanliness for right colon (caecum, ascending colon), the mid colon (transverse and descending colon), and the rectosigmoid region each, and the total OBPS was compared between groups, and no statistically significant difference was detected (Table 2). The total OBPS for pineapple group and control group were 4.77 and 5.0, respectively. Adequate bowel preparation was seen in 25 patients in the control group (54.3%), and in 27 patients in the pineapple group (61.4%), but the difference was not statistically significant.

The tolerability did not differ between the groups according

to the colonoscopic preparation regime. The percentage of patients who were able to finish the entire bowel cleansing regime was 96% in the control group and 94% in the pineapple group. Fourteen patients in the control group (30.4%) and 16 patients in the pineapple group (36.3%) found it hard to complete the preparation regimen. Among the pineapple group 3 patients complained that pineapple juice tastes bad, and the remaining patients rated it as good.

**Table 1.** Baseline characteristics of the patients

| | Control Group (n:46) | Pineapple group (n:44) | p |
|---|---|---|---|
| Age (years) | 51.04 | 50.57 | 0.88 |
| Male/female | 24/22 | 24/20 | 0.82 |
| Body mass index (kg/m2) | 28.18 | 27.46 | 0.49 |
| Prior colonoscopy | 16 (34.8%) | 13 (29.5%) | 0.60 |
| Diabetes mellitus | 5 (10.8%) | 8 (18.2%) | 0.33 |
| Constipation | 14 (30.4 %) | 11 (25 %) | 0.42 |

**Table 2.** Bowel preparation results of the groups

| | Control Group (n:46) | Pineapple group (n:44) | P |
|---|---|---|---|
| Right colon cleanliness | 2.07 | 2.09 | 0.92 |
| Mid colon cleanliness | 1.24 | 1 | 0.21 |
| Rectosigmoid cleanliness | 1.02 | 1.23 | 0.35 |
| Total OBPS | 5.0 | 4.77 | 0.69 |
| Inadequate cleaning (OBPS≥6 patients) (n) | 21 (45.6%) | 17 (38.6%) | 0.51 |

OBPS: Ottawa Bowel Preparation Score

## DISCUSSION

Effective cleaning of the colon prior to colonoscopy is necessary for good endoscopic

visualization and to reduce the potential for missed pathological findings (1-3). Cleansing quality determines quality, difficulty, speed, and completeness of colonoscopy (1). Furthermore suboptimal bowel preparation carries a higher cost and increases the cost by 12-22% (15). Because the critical importance of preparation quality, and the outcome of suboptimal preparation, various studies have been evaluated to find the optimal preparation regimen (5). The ESGE guideline recommends a regimen of 4 L PEG solution, and advises against the use of oral NaP for bowel preparation (5). Because PEG was not available in Turkey, we used high dose sennoside A+B calcium for routine colon cleansing at our colonoscopy unit. Senna laxatives contain anthraquinone derivates that are activated by colonic bacteria, and the activated derivates have a direct effect on intestinal mucosa: increasing the colonic motility, enhancing colonic transit, and inhibiting water and electrolyte secretion (7). Its use alone has not been popular (5) and there are few studies comparing sennosides with NaP (7-9). In these studies sennoside A+B calcium was as effective as NaP.

Our study assessed the effect of adding pineapple juice to sennoside A+B calcium for colon cleansing, and showed no benefit to improve the quality of colon cleansing. Previously, the proteolytic effect of pineapple juice on a phytobezoar-related intestinal bowel obstruction and on undigested food in a diabetic patient was shown, (11,12) and based on these data, Altinbas et al investigated pineapple juice to enhance bowel cleansing prior to colonoscopic examination (13). To our best knowledge this study was the only research done with pineapple juice for colonoscopy cleansing to date. They added one liter of pineapple juice to 2 liter PEG, and found that this preparation regime may improve the quality of bowel cleansing. But opposite to the above mentioned study we could not show any benefit by adding pineapple juice to bowel cleaning regime. In the study design there are some differences between our study and Altınbas et al's study. They used one liter of packed pineapple juice, whereas we advised to use freshly squeezed pineapple, because packed juices are usually processed under high temperature and this heat treatment for sterilization purposes may contribute to some components be denatured, especially bromelain (16). The discrepancy between these studies may be because of the different preparation and amounts of the pineapple juice. Another difference is the colon preparation regimen. We used sennoside A+B calcium, whereas they used PEG as preparation, and the benefit of pineapple juice may be limited to PEG use. In another study investigators have shown that bromelain exerts inhibitory effects on intestinal motility in mice, which may also complicate colon cleaning (17).

The rate of adequate bowel preparation in our total study group is 57.8 % and is low compared to other studies with senna preparations, (8, 9, 18) which could be because of endoscopists interpretation of colon cleansing.

In conclusion, adding fresh squeezed pineapple juice to sennoside A+B calcium has no beneficial effect on increasing colon cleansing before colonoscopy.

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