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Review Article

Recent insight on chronic constipation disease: a review of literature

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ABSTRACT

Chronic constipation (CC) is a condition in which person feels extreme difficulty in defecation or passage of stools. Generally, when a person defecates less than three time in a week it is considered as constipation and when this condition prolongs, it becomes chronic constipation. There are various factors which are responsible for this condition such as a low fiber diet, insufficient intake of water, poor lifestyle choices, slow colonic passage, and Irritable bowel syndrome (IBS) can all contribute to CC. Other factors that can cause CC include a low economic status, poor education, lack of physical activities, and medications. The aim of this review is to provide a comprehensive overview of the disease by detailing the causes, mechanisms, diagnosis, and treatment options. A comprehensive and systematic search has been conducted using PubMed, Medline, and Google Scholar. The main set of keywords used for the literature search was 'Constipation', 'treatment', 'management', 'diagnosis' and 'clinical presentation'. The first approach for screening the article was the title of the publication. Then the abstract of the selected articles was read as a second step in screening the article. The results of this review indicate that CC causes are multi-factorial, and the treatment approaches depend on the underlying cause. CC is a common disease with a global prevalence of 14%. This disease is more common in older people and women. It can be managed by changes in diet, lifestyle and if necessary, it can be treated with medications and surgery.

Keywords: Chronic constipation, Disease, Treatment

INTRODUCTION

Chronic constipation (CC) is one of the most common digestive conditions with reported cases involving 20 percent of the general population.[1] CC is the difficulty or inability to defecate (evacuation) frequently, usually less than three times a week, and may last for several weeks.[2] The Rome III diagnostic criteria- manual manoeuvres needed for defecation, hard stools, stool frequency, the sensation of anorectal blockage, straining, and incomplete evacuation- is usually used to define chronic constipation (Table 1). The presence of two or more of these criteria in the last three months, with an onset of symptoms more than six months old, indicate the patient has chronic constipation.[3] Many factors play significant roles in the pathogenesis of this disease. These include nutrition, genetics, ingestion, medications, Irritable bowel syndrome (IBS), and daily habits.[2]

CC is more common in people aged 65 and older. This is due to several factors like poor diet, medication, insufficient fluid intake, and insufficient physical activities.[4] The symptoms of chronic constipation include straining, a sense of incomplete evacuation, hard stools, and an inability to pass stool.[5] CC treatment usually begins with non-pharmacological options such as diet and lifestyle changes. As changing diet not only to improve digestion but also improve the gut movement leading to normal defecation. Pharmacological measures such as laxatives, stool softeners, fibre supplements, and other medications can be used when non-pharmacological options fail.[3]

The aim of the study was to provide an evidence-backed explanation of what chronic constipation is.

Table 1: Rome III criteria for chronic constipation.

Presence of two or more of the following
Straining during more than 25% of defecations.
Lumpy or hard stools more than 25% of defecations.
Sensation of incomplete evacuations for more than 25% of defecations.
Sensation of anorectal blockage for more than 25% of defecations.
Manual manoeuvres to facilitate more than 25% of defecations.
Fewer than three bowel movements per week.
Loose stools are rarely present without laxatives.

Prevalence rate of chronic constipation in adults

The average prevalence rate has been estimated as 16% throughout the world. The prevalence rate in Iran is estimated to 1.4% and 37%.[6] The average cost for healthcare for constipation is $7522 per person in the United States.[7] A study conducted by Pena et al found that the prevalence of self-reported chronic constipation in Madrid is 4.1%.[8]

CC occurs more frequently in women than in men. The prevalence ratio of chronic constipation in women is 37%, while in men, it is 14%. The highest prevalence rate of chronic constipation was found in Iran (22.9%), France (22.4%), and Colombia (21.7%).[9] Ford et al conducted a review of the literature and the estimated global prevalence of chronic constipation from 1974 to 2010. The study found a 14% global prevalence rate.[10]

Epidemiology

There have been numerous epidemiological studies of chronic constipation using a myriad of techniques, including questionnaires, to confirm the occurrence of chronic constipation. Suares et al conducted research and meta-analysis to evaluate the incidence and cause of chronic constipation in self-reported cases involving adults in the community.

The survey was conducted in 41 separate adult populations and found that the prevalence of chronic constipation was lower in South East Asian studies.[11] An age and gender-based study were conducted on a community in the US to ascertain the prevalence of the disease in the target population. The reported data includes an age prevalence rate of 19.2% and gender-based prevalence rate of 11.0%.[12]

Epidemiological studies have found that the prevalence of chronic constipation is dependent on traditions, the standard of living, genetic factors, nutritional remedies, and use of illegal drugs.[13] Further studies on the epidemiology of CC concentrate on the sex, age, geographical distribution and economic status of the studied population.

Geography

Most of the studies were directed in Northern Europe and North America. None were conducted in South Asia, while only a few researches were carried out in South America and the Middle East. The data show that the regions have a prevalence rate of chronic constipation of 14%-16%.[6]

Age distribution

Chronic constipation is considered to be more common in the elderly.[14] According to Suares et al CC risk increases with age. Chances of contracting CC is significantly high for those who are 65 years old and above.[4,11]

Gender distribution

The prevalence of chronic constipation is more common in women than in men. It was found that pregnant women, especially those in the third trimester, are more at risk of contracting CC due to a significant increase and release of hormones, which significantly decreases intestinal movement and encumbers emptying the intestine due to reflex pressure. Irregular menstrual cycles also significantly increase the risk of chronic constipation in women.

Irregular menstrual cycles cause hormonal disturbances in a women which lead to a disturb gastrointestinal system. Moreover, change in hormones also leads to mood disturbances and depression which also cause the constipation. Also, women are more likely to use laxatives than their male counterparts.[14]

Causes of constipation

Studies show that the pathophysiology of chronic constipation is multi-factorial and can be traced to diet, lifestyle, diseases, and the use of drugs.[15] A low fiber diet, insufficient intake of water, poor lifestyle choices, slow colonic passage, and IBS can all contribute to chronic constipation (Table 2).

Other factors that can cause CC include a low economic status, poor education, lack of physical activities, and medications.[16] It also has been reported that physiological conditions such as age, gender, and pregnancy can increase the risk of constipation.

Some diseases, like spinal cord disorder, muscular dystrophy, Parkinson's disease, and diabetes mellitus, are associated with chronic constipation. These diseases cause nerve damage and disturb the neuronal system of Gastrointestinal tract (GIT) leading to a disturbed peristalsis, which ultimately causes constipation.

Table 2: Most common causes of constipation.

Common causes of constipation	Examples
Diet and lifestyles	Lack of physical activity Law fiber-diet
Medications	Opioids, antacids, Digoxin, antipsychotics
Psychiatric disorder	Anxiety, depression
Neurogenic causes	Multiple sclerosis, Parkinson's disease
Idiopathic causes	Slow colon transit, evacautory disorder
Metabolic and endocrine disorder	Diabetes mellites, renal failure, hypothyroidism
Colon disease	IBS, haemorrhoids

Diet distribution

CC has been observed in individuals with low dietary fiber intake, insufficient intake of fruits, and vegetables. CC due to a diet is not a serious problem, which can be treated by non-pharmacological measures and lifestyle changes. Furthermore, increasing fiber intake can reduce transit time through the large intestine, which helps prevent constipation.[17]

Secondary cause of constipation

There are constipation-inducing diseases such as colon disorder, rectal, or anal restriction, bacterial infection, and narrowing of the intestine or rectum. Mental conditions, such as depression, eating disorders, and nervousness also increase the risk of constipation. Some neurological disorders, such as spinal cord injury, stroke, Parkinson's disease, and other nervous disorders, can also increase the risk of constipation. These diseases cause nerve damage and disturb the neuronal system of GIT leading to a disturbed peristalsis, which ultimately causes constipation.

Metabolic conditions like diabetes mellitus, hyperthyroidism, hypothyroidism, hypercalcemia, hyperkalemia, and pregnancy can also cause constipation. Other disorders such as anorectal disorders, which includes anal strictures, anal fissures, and hemorrhoid.[15]

Medications

Several drugs can cause chronic constipation.

These drugs include anticholinergic drugs such as hyoscine, antipyretic drugs such as morphine and codeine, antipsychotics such as haloperidol and clozapine, antiepileptic drugs such as phenytoin and carbamazepine. Calcium and iron are the causative agents of chronic constipation.

Furthermore, the hypertensive agents, anti-ulcer medications, antihistamines, and antioxidants are associated with chronic constipation.[18]

Effect of socioeconomic and education status on constipation

Several studies have reported on the effect of educational and economical status on the prevalence of constipate.[19,20] Poor communities are more at risk of constipation than rich communities. A study conducted in Iran found an inverse relationship between education and socioeconomic status and the prevalence rate of constipation.[6]

Quality of life and economic impact

Chronic constipation impacts a patient's quality of life negatively. Many studies report a decrease in health-related quality of life, mental health, and physical pain. Millions of dollars are spent annually on laxatives. Studies indicate that the physical, mental, and social functions of constipated people are lower than non-constipated people. Constipation prevention program strategies can reduce the cost significantly.[21]

Pathophysiology

A primary reason for abnormalities: if bowel movements, or the abnormalities in the pelvic base muscles during defecation. Propulsive movement in most of the patients having gastrointestinal tract is peristalsis during motor activity, which engages coordination the relaxation and contraction of the intestinal muscles, which exert the pressure are increased between the muscles of the intestine.[22] The peristalsis is not the main function of the forwarding movement, while it is the main function of colon. Besides these things, the colonic passage occurs several times per day while some time leads to defecation of general contraction, accumulation of mass movement.[6]

DIAGNOSIS

Chronic constipation is difficult to diagnose because symptoms are varied from one patient to another. Because the definition of constipation can be different in different persons, as the frequency of stool passing can be varied person to person. Therefore, a person saying to have constipation can be completely normal for other person. Therefore, there are several diagnostic methods which are used to diagnose the condition of chronic constipation. Several diagnostic methods are colonoscopy, stool blood tests, and thyroid function.[2,23]

Laboratory tests

Laboratories tests are often recommended and can be useful in telling various associated diseases which can lead to constipation but there is no sufficient evidence to support their importance in chronic constipation diagnosis directly. These tests include complete blood count which tells about inflammatory conditions such as inflammatory bowel syndrome, serum thyroid function which again tells about the hormones, electrolytes, glucose giving idea about diabetes, and calcium.[24]

Endoscopy

A colonoscopy or sigmoidoscopy is a procedure in which fibreoptic fibre is used to examine the colon and rectal area directly and can give the direct idea about the surface anatomy.

It is usually performed in patients with alarming symptoms such as rectal bleeding, weight loss, blood in stools, or patients undergoing colorectal cancer screening and as everything is examined digitally in live time its diagnosis is very good.

Moreover, if a person is suspected to have colon cancer, a biopsy can also be taken while doing the colonoscopy.[23,25]

RADIOLOGICAL TESTS

Plain abdominal X-ray

Although plain abdominal X-rays are commonly used to assess faecal loading, the evidence to support it is insufficient.[18] Therefore, for accurate diagnosis latest methods like Barium enema are preferable.[23]

Barium enema

This is an advance procedure as compared to plain X-rays where barium injection is injected through anus as enema and X-ray is done. It is also called colon X-ray.

This procedure is used to determine colon abnormalities. However, there is insufficient evidence supporting this procedure. It has been replaced with endoscopy which is more advanced procedure and has more diagnostic values. Therefore, barium enema is only used where the facility of endoscopy is not available.[18]

Endoscopic ultrasound

It is a modified and minimally invasive procedure. A special endoscope is used for this process which has the ability to produce high frequency waves. These high frequency waves, lining just as in normal ultrasound, make the image of the gut.

This procedure can also be used to take sample from the colon and called fine needle aspiration which is effective to evaluate cancer. However, this procedure is not effective in constipation evaluation, although it is useful in assessing anal sphincter integrity and presacral space.[18]

Defecography

This test is designed to reveal anatomical variations in the anorectum, which may cause chronic constipation.

However, due to the lack of patient discomfort and standardized techniques, this test is not usually performed in clinical settings.[26]

Physiological testing

This test is usually used to help measure the physiological movement of stool within the colon and rectum.[27] There are various methods to perform it and can be chosen according to the feasibility and physician own preference. These methods include colon transit study, Anorectal motility (ARM), Balloon expulsion test (BET), scintigraphy, and electrophysiology. Each method has its own benefits and limitations.

Colon transit study

In this procedure, the patient ingests gelatine capsules containing a radiopaque marker or wireless recording device. This test is widely performed and inexpensive, but it has some limitations. The test cannot measure colon transit; it instead measures the total oral-anal transit. Studies have also shown that this test has poor reproducibility, particularly in individuals with slow transit.[6,27]

Anorectal manometry or ARM

This test is used to measure pressure activity within the rectum and dys-synergic defection. It shows rectal sensation, the presence of anorectal reflexes, and rectal compliance. In this procedure a small tube is inserted beyond anal sphincter and balloon attached on the end of tube is inflated. This inflation cause pressure on muscles and nerves while relaxation and contraction is recorded in machine. Recent studies have found that ARM has poor sensitivity and insufficient definition for dys-synergic defecation.[24] Therefore, currently, it is not as preferred as it used to in the past for the diagnosis of chronic constipation.

BET

This test measures the patient's ability to expel a rectal balloon filled with 50ml of fluid or air.

Dys-synergic defecation will be confirmed if the patient fails. Patient embarrassment is a limitation of this test. Studies show that 23%-67% of patients have impaired expulsion. The lack of standardisation is another weakness of this test.[6,27]

Scintigraphy

It is an advanced technique used in nuclear medicine. In this procedure, the transit of radiolabelled stool through the colon is measured by using nuclear medicine. The disadvantage of this procedure it is availability. Due to complex procedure and minimum availability it is not used that frequently.

Therefore, this test is used only for research purposes, so it is not available in clinical settings.[18]

Electrophysiology

This test is used to assess the electrical system. A catheter and electrodes are inserted, and electrical activity is recorded in the machine, giving an idea about the transportation of colon's contents. It can give an idea about various conditions like IBS, diarrhoea including constipation. This test is currently used in clinical research. It includes pudendal nerve terminal motor latency measurements and electromyography of the external anal sphincter or puborectalis.[18]

MANAGEMENT OF CHRONIC CONSTIPATION

Change in lifestyle choices

Usually, the initial treatment for a constipated patient is changing their habits and lifestyle.[19] Lifestyle measures include a high fiber diet, sufficient water, and fluid intake, and physical activities.[28,29] All these measures lead to a good gut health. High fiber helps in making fecal bulk and improve the gut movements, sufficient water makes stool content soft and stop to make it hard (which leads to constipation), and physical activity causes betterment of gut movements.

Increased fluid intake

Increased water and fluid intake can stave off constipation symptoms. Though there is no sufficient evidence that fluid intake can treat constipation, it can improve the condition.[30] On the other hand, a diet containing high fiber and fluid have been found to be effective though there was no effect on gastrointestinal function when a healthy individual combined wheat bran with extra fluid intake.[6] However, the increase in fluid intake with high fiber diet can give promising results.

Physical activities

Physical activities are considered as the key to the management of severe constipation in young patients.[31,32] Several research studies have found that physical activities have positive effects on the gastrointestinal symptoms of constipated individuals. Health welfare programs that include physical activities might be beneficial for patients suffering from chronic constipation.[33]

Medications

The approved drugs for the treatment of constipation include laxatives such as osmotic laxative, stimulant laxative, serotonergic 5-HT, and receptor antagonists.[34] The osmotic laxatives increase the osmotic pressure gradient in the intra-luminal area, whereas serotonin agonist increases colonic passage due to prucalopride due to high selectivity toward the receptors, and surgery is the last option when medications have failed to treat chronic constipation.

Osmotic laxative

If non-pharmacological measures fail, one of the recommended medications for the treatment of chronic constipation is osmotic laxative.[35] The use of osmotic laxatives increases the osmotic pressure gradient in the intra-luminal area, which results in stool regularities and increasing stool volume due to the secretion of electrolytes and water supplement into the intestinal luminal area.[36]

Osmotic laxatives such polyethylene glycol is used to treat severe cases of chronic constipation over a 6-months duration, and the results were compared with a placebo.

A study reported that the polyethylene was superior to other osmotic laxatives, while placebos were considered sub-optimal against laxatives such as 5-HT4 receptor agonist. Escherichia coli is the most prominent bacteria present at the lumen, which ferments lactulose into short fatty acids chain, which in turn increases chronic constipation therapy from mild to moderate but often have harmful effects such as a swollen bowl.[37] Magnesium and potassium, prominent treatments for CC, are poorly absorbed by our body.[36]

Stimulant laxatives

Stimulant laxatives are used when osmotic laxatives fail.[38] They do stimulate the intestinal movement and release of prostaglandin, which increases the speed of colonic passage. When peristalsis increases, it in turn increases water and electrolyte secretion.[39] These high contents of electrolyte and water not only soften the fecal contents but also increase the gut movement and can help to relieve constipation.

Use of serotonin agonist

5-HT receptor agonist triggers the stimulation and signaling of the afferent neurons, which can increase colonic passage due to prucalopride due to high selectivity toward the receptors. Prucaloprides have shown positive results from clinical trials regarding stool frequency and stool softening compared to placebos.[40]

Surgery

Surgical treatment is the last option when medications have failed to treat chronic constipation.

The recommended technique is the emptying of the colon mechanically, with patients having slow bowl passage enema program was considered for the increase the speed. Using other techniques such as colectomy with ileorectal anastomosis is recommended for slow speed bowel movement in CC.

The repair and pelvic floor retraining are also recommended when treating CC.[6]

CONCLUSION

Chronic constipation is a common disease with a global prevalence of 14%. This disease is more common in older people and women. It can be caused by poor nutrition habits, lifestyle choices, and medications. CC has a negative impact on a patient's quality of life, and patients need to seek medical advice. Non-pharmacological treatments such as diet and lifestyle measures are the first line in chronic constipation treatment. The second line of treatment is using medications such as laxatives. If diet, lifestyle measures, and laxative therapies fail to provide adequate relief, serotonin agonists can be used. The surgical option should be considered if all other options have failed to treat the condition.

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REFERENCES

1. Roque M, Bouras EP. Epidemiology and management of chronic constipation in elderly patients. Clin Interv Aging. 2015;10:919-30.
2. Jamshed N, Lee ZE, Olden KW. Diagnostic approach to chronic constipation in adults. Am Fam Physician. 2011;84(3):299-306.
3. Selby W, Corte C. Managing constipation in adults. Australian Pres. 201033(4): 116-9.
4. Bosshard W, Dreher R, Schnegg JF, Büla CJ. The treatment of chronic constipation in elderly people: an update. Drugs Aging. 2004;21(14):911-30.
5. Liu LW. Chronic constipation: current treatment options. Can J Gastroenterol. 2011;25:22-8.
6. Forootan M, Bagheri N, Darvishi M. Chronic constipation: A review of literature. Medicine (Baltimore). 2018;97(20):10631.
7. Nyrop KA, Palsson OS, Levy RL, Korff M, Feld AD, Turner MJ, et al. Costs of health care for irritable bowel syndrome, chronic constipation, functional diarrhoea and functional abdominal pain. Aliment Pharmacol Ther. 2007;26(2):237-48.
8. Peña M, García RJ, Olalla JM, Llanos EV, Miguel AG, et al. Impact of the most frequent chronic health conditions on the quality of life among people aged >15 years in Madrid. Eur J Public Health. 2010;20(1):78-84.
9. Fosnes GS, Lydersen S, Farup PG. Constipation and diarrhoea - common adverse drug reactions? A cross sectional study in the general population. BMC Clin Pharmacol. 2011;11:2.
10. Suares NC, Ford AC. Systematic review: the effects of fibre in the management of chronic idiopathic constipation. Aliment Pharmacol Ther. 2011;33(8):895-901.
11. Suares NC, Ford AC. Prevalence of, and risk factors for, chronic idiopathic constipation in the community: systematic review and meta-analysis. Am J Gastroenterol. 2011;106(9):1582-91.
12. Heidelbaugh JJ, Stelwagon M, Miller SA, Shea EP, Chey WD. The spectrum of constipation-predominant irritable bowel syndrome and chronic idiopathic constipation: US survey assessing symptoms, care seeking, and disease burden. Am J Gastroenterol. 2015;110(4):580-7.
13. Sanchez MI, Bercik P. Epidemiology and burden of chronic constipation. Can J Gastroenterol. 2011;25:11-5.
14. Bharucha AE, Pemberton JH, Locke GR. American Gastroenterological Association technical review on constipation. Gastroenterology. 2013;144(1):218-38.
15. Tack J, Lissner S, Stanghellini V, Boeckxstaens G, Kamm MA, Simren M, et al. Diagnosis and treatment of chronic constipation--a European perspective. Neurogastroenterol Motil. 2011;23(8):697-710.
16. Dukas L, Willett WC, Giovannucci EL. Association between physical activity, fiber intake, and other lifestyle variables and constipation in a study of women. Am J Gastroenterol. 2003;98(8):1790-6.
17. Yang J, Wang HP, Zhou L, Xu CF. Effect of dietary fiber on constipation: a meta analysis. World J Gastroenterol. 2012;18(48):7378-83.
18. Gray JR. What is chronic constipation? Definition and diagnosis. Can J Gastroenterol. 2011;25:7-10.
19. Scott SM, Berg MM, Benninga MA. Rectal sensorimotor dysfunction in constipation. Best Pract Res Clin Gastroenterol. 2011;25(1):103-18.
20. Chan CL, Lunniss PJ, Wang D, Williams NS, Scott SM. Rectal sensorimotor dysfunction in patients with urge faecal incontinence: evidence from prolonged manometric studies. Gut. 2005;54(9):1263-72.
21. Trads M, Pedersen PU. The association between constipation and quality of life, health related quality of life and health status in adults: a systematic review protocol. JBI Database System Rev Implement Rep. 2015;13(6):45-55.
22. Andrews CN, Storr M. The pathophysiology of chronic constipation. Can J Gastroenterol. 2011;25:16-21.
23. Rao SS, Meduri K. What is necessary to diagnose constipation? Best Pract Res Clin Gastroenterol. 2011;25(1):127-40.
24. Rao SS, Ozturk R, Laine L. Clinical utility of diagnostic tests for constipation in adults: a systematic review. Am J Gastroenterol. 2005;100(7):1605-15.
25. Pepin C, Ladabaum U. The yield of lower endoscopy in patients with constipation: survey of a university hospital, a public county hospital, and a Veterans Administration medical center. Gastrointest Endosc. 2002;56(3):325-32.
26. Locke GR, Pemberton JH, Phillips SF. American Gastroenterological Association Medical Position Statement: guidelines on constipation. Gastroenterology. 2000;119(6):1761-6.
27. Dinning PG, Smith TK, Scott SM. Pathophysiology of colonic causes of chronic constipation. Neurogastroenterol Motil. 2009;21(2):20-30.

28. Huang L, Jiang H, Zhu M, Wang B, Tong M, Li H, et al. Prevalence and Risk Factors of Chronic Constipation Among Women Aged 50 Years and Older in Shanghai, China. Med Sci Monit. 2017;23:2660-7.
29. Markland AD, Palsson O, Goode PS, Burgio KL, Whitehead J, Whitehead WE. Association of low dietary intake of fiber and liquids with constipation: evidence from the National Health and Nutrition Examination Survey. Am J Gastroenterol. 2013;108(5):796-803.
30. Lissner SA, Kamm MA, Scarpignato C, Wald A. Myths and misconceptions about chronic constipation. Am J Gastroenterol. 2005;100(1):232-42.
31. Giorgio R, Ruggeri E, Stanghellini V, Eusebi LH, Bazzoli F, Chiarioni G. Chronic constipation in the elderly: a primer for the gastroenterologist. BMC Gastroenterol. 2015;15:130.
32. Mearin F, Ciriza C, Mínguez M, Rey E, Mascort JJ, Peña E, et al. Clinical Practice Guideline: Irritable bowel syndrome with constipation and functional constipation in the adult. Rev Esp Enferm Dig. 2016;108(6):332-63.
33. Chey WD, Kurlander J, Eswaran S. Irritable bowel syndrome: a clinical review. JAMA. 2015;313(9):949-58.
34. Ford AC, Moayyedi P, Lacy BE, Lembo AJ, Saito YA, Schiller LR, et al. American College of Gastroenterology monograph on the management of irritable bowel syndrome and chronic idiopathic constipation. Am J Gastroenterol. 2014;109(1):2-26.
35. Dipalma JA, Cleveland MV, McGowan J, Herrera JL. A randomized, multicenter, placebo-controlled trial of polyethylene glycol laxative for chronic treatment of chronic constipation. Am J Gastroenterol. 2007;102(7):1436-41.
36. Cinca R, Chera D, Gruss HJ, Halphen M. Randomised clinical trial: macrogol/PEG 3350+electrolytes versus prucalopride in the treatment of chronic constipation -- a comparison in a controlled environment. Aliment Pharmacol Ther. 2013;37(9):876-86.
37. Leung L, Riutta T, Kotecha J, Rosser W. Chronic constipation: an evidence-based review. J Am Board Fam Med. 2011;24(4):436-51.
38. Ikarashi N. The laxative effect of bisacodyl is attributable to decreased aquaporin-3 expression in the colon induced by increased PGE2 secretion from macrophages. Am J Physiol Gastrointest Liver Physiol. 2011;301(5):887-95.
39. Manabe N, Cremonini F, Camilleri M, Sandborn WJ, Burton DD. Effects of bisacodyl on ascending colon emptying and overall colonic transit in healthy volunteers. Aliment Pharmacol Ther. 2009;30(9):930-6.
40. Camilleri M, Kerstens R, Rykx A, Vandeplassche L. A placebo-controlled trial of prucalopride for severe chronic constipation. N Engl J Med. 2008;358(22):2344-54.

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