

Effect of Reinforced Video by WeChat on Adenoma Detection Rate for Colonoscopy

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ABSTRACT

Objective: To evaluate the influence of reinforced educational video through smartphone WeChat on adenoma detection rate (ADR).

Study Design: Randomised controlled study.

Place and Duration of the Study: Department of Gastroenterology, Xiantao First People's Hospital affiliated to Yangtze University, Hubei, China, from May 2020 to December 2021.

Methodology: All participants received written instructions regarding bowel preparation and diet before colonoscopy. After randomisation, patients in video group received educational videos through WeChat, two days before the colonoscopy. The primary endpoint was ADR. The secondary outcomes were polyp detection rate (PDR), quality of bowel preparation, adverse events, and satisfaction with preparation.

Results: Five-hundred and sixty-four patients were included in the study (284 in video group and 280 in non-video group). ADR was similar in both groups without significant difference (26.4% vs. 23.2%, $p=0.38$). PDR was not different among the two groups (31.7% vs. 30.4%). The total cleansing score and percentage of adequate bowel preparation in the video group were higher compared with non-video group ($p<0.05$). Moreover, patient satisfaction was also higher in video group ($p=0.048$), and the incidence of adverse events in both groups was similar.

Conclusion: The availability of a supplementary educational video before colonoscopy was insufficient to improve ADR and PDR, but offered benefits on bowel preparation quality and patient satisfaction.

Key Words: Video, Adenoma detection rate, Bowel preparation, Colonoscopy.

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INTRODUCTION

Colonoscopy is commonly used to investigate the whole colon and is the most accurate technology for colorectal cancer diagnosis. A safe and effective colonoscopy relies on optimal bowel preparation.¹ However, inadequate bowel preparation is encountered in 25-30.5% of the patients who undergo colonoscopy.^{2,3} Poor preparation prior to colonoscopy may hamper the detection rate of positive findings, increase cancellation rate, and cost for the patients.⁴⁻⁶

Ideal bowel cleansing is associated with many factors, and it mainly depends on patients' compliance with respect to instructions about purgatives and diet.⁷ In recent years, several studies have demonstrated that reinforced education for patients offers improvements in bowel preparation through telephone intervention, short message service, and video.⁸⁻¹¹

These methods may improve the quality of colonoscopy and other indicators through improved adherence to the instructions for diet and ingestion of purgatives. Park *et al.* reported that an educational video instruction before the colonoscopy offered benefits on bowel cleansing but not polyp detection rate (PDR), whereas Rice *et al.* demonstrated that a supplementary video on diet was insufficient to improve bowel preparation quality.^{10,11} Furthermore, Wen *et al.* reported that an educational video improved the cleansing of entire colon and PDR.¹² Evidence favouring the benefit of reinforced educational video is inconsistent.

Thus, the authors developed a reinforced educational video for patients before colonoscopy focusing on diet and ingestion of purgatives. The educational video included pictorial samples of food and brief guidelines of purgative ingestion. The objective of this trial was to evaluate the influence of the educational video on colonoscopy indicators i.e. adenoma detection rate (ADR), PDR, quality of bowel preparation, satisfaction, and adverse events.

METHODOLOGY

The randomised controlled study was prospectively conducted at the Department of Gastroenterology, Xiantao First People's Hospital, Yangtze University, from May 2020 to December

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2021. Written informed consent was received from each participant. This study was approved by the Human Ethics Committee of Xiantao First People's Hospital affiliated to Yangtze University (No. 201913, dated 2019.12.10).

All consecutive individuals aged from 18 to 80 years who were scheduled for colonoscopy were enrolled. WeChat application was used among the included patients or their family members in the same house. Exclusion criteria was as follows: pregnancy and lactation, severe congestive heart failure (\geq New York Heart Association Classes III), bowel obstruction, structural intestinal disorders, liver failure, and (patient or his/her escort) inability to use a mobile phone or provide informed consent.

A random number table for randomisation was generated by using a computer programme. The enrolled patients were allocated to one of the two groups when they made their appointment (almost on 5th day before the colonoscopy in the centre). The included patients were randomised to two groups: video group or non-video group. Patients in the video group obtained the standard education (written bowel preparation instructions) and an educational video through WeChat for bowel preparation (free of charge) and patients in the non-video group received the standard education. Investigators, endoscopists, and nurses involved in the colonoscopy procedure were blinded to the randomised allocation.

Each participant was instructed to consume three packets of polyethylene glycol (Hengkang Pharmaceutical Co. Ltd., China) dissolved in 3L of water and 12ml dimeticone (JianNeng Pharmaceutical Co. Ltd., China) on the morning of the colonoscopy (6-9 am). Soft drinks were allowed until the day before colonoscopy.

Each participant was asked to adhere to a 3-day low-fiber diet prior to colonoscopy. All patients were educated about bowel preparation by a nurse and were also provided with written instructions regarding dietary guidelines and ingestion of purgatives at the time of their appointment. Only the patients in the video group were sent the WeChat link address 2 days before the colonoscopy. The 6-minute educational video included pictorial demonstrations of food, simplified instructions of purgatives ingestion, and fecal water photos.

The colonoscopic procedures were performed by experienced colonoscopists (above 1000 colonoscopies every year). Olympus CF-290 series colonoscopes were used to complete all colonoscopy procedures. All procedures were performed in the afternoon from 14:00 to 17:00. Some individuals were provided sedation with propofol during their procedures. Bowel cleansing (Boston Bowel Preparation Scale), and colonoscopy findings including the number, size of polyps, and other lesions were recorded.

The primary outcome was ADR. The definition of ADR was the rate of patients undergoing colonoscopy in whom at least one adenoma (confirmed histologically) was detected. The secondary outcome was quality of bowel cleansing according to the Boston Bowel Preparation Scale (BBPS).¹³ Adequate quality of bowel preparation was defined as a total BBPS score ≥ 6 with

each segment score ≥ 2 . PDR was defined as the proportion of patients in whom at least one polyp (confirmed histologically) was detected. Brief questionnaires were sent to patients to complete before the endoscopic examination to evaluate the patient satisfaction and adverse events. The degree of satisfaction was assessed on a five-point numerical scale (1, very high; 2, high; 3, moderate; 4, low; and 5, very low).¹⁴

Based on the previous studies, the ADR of the Chinese patients was reported to range from 14 to 22%.^{15,16} Therefore, a sample size of 238 patients was estimated in each group with a statistical power of 80% to show 10% improvement in the ADR. A dropout rate of 10% was considered, so at least 262 patients were needed in each arm.

Statistical analyses were conducted by using SPSS 22.0 (IBM, NY, USA). Differences between two groups for categorical variables (expressed as the counts with percentages) were assessed with Chi-square tests. Continuous variables were shown as mean \pm standard deviation (SD) and assessed with independent sample test. The p-value < 0.05 was considered statistically significant. All analyses were evaluated on the intention-to-treat (ITT) analysis because very few patients cancelled the colonoscopy.

RESULTS

Overall, 612 eligible patients were screened for recruitment in this study. Of these, 48 patients were excluded because of the inability to use a mobile phone ($n=21$), congestive heart failure \geq III ($n=10$), history of colon surgery ($n=6$), and bowel obstruction ($n=1$). Finally, a total of 568 individuals were randomly assigned to both groups. One patient in video group and three patients in non-video group cancelled the colonoscopy procedure, and thus, 564 patients were evaluated. The baseline characteristics of the video and non-video groups are presented in Table I. No significant differences were found between the two groups.

There was no significant difference in cecal intubation rate, but the intubation time was shorter in the video group ($p = 0.047$). Regarding the primary outcome, the ADR was similar in both groups (26.4 % vs. 23.2 %; $p = 0.380$), as was the PDR (31.7 % vs. 30.4 %; $p = 0.732$). Other findings during colonoscopy procedure were also not statistically different between the video and non-video groups ($p=0.779$, Table II).

Compared with the non-video group, each segmental score in the video group was significantly better, and a similar result was found for total BBPS score. Moreover, adequate quality of bowel preparation was more in video group than in non-video group (95.1% vs. 90.0%, $p=0.022$) (Table III).

In terms of patients' satisfaction and adverse events, Table III shows the satisfaction of intake among the patients. The proportion of patients who reported very high satisfaction was higher in the video group than the non-video group ($p=0.048$).

Main adverse events were abdominal bloating, vomiting and nausea. Adverse events did not differ among both the groups (Table III).

Table I: Baseline characteristics.

	Video group (284)	Non-video group (280)	p-value
Age (mean \pm SD, years)	56.0 \pm 14.6	53.6 \pm 13.7	0.053 ^a
Gender, male/female, n (%)	166 (58.5%) / 118 (41.5%)	141 (50.4%) / 139 (49.6%)	0.054 ^b
Body mass index, mean \pm SD, kg/m ²	24.2 \pm 2.4	24.0 \pm 2.7	0.467 ^a
History of abdominal surgery, n (%)	20 (7.04%)	20 (7.14%)	0.963 ^b
Hypertension	74 (26.1%)	58 (20.7%)	0.134 ^b
Diabetes	29 (10.2%)	26 (9.3%)	0.711 ^b
Indications			
Post-polypectomy surveillance	11 (3.9%)	9 (3.2%)	0.672 ^b
CRC screening	24 (8.5%)	33 (11.8%)	0.189 ^b
Abdominal pain	77 (27.1%)	59 (21.1%)	0.094 ^b
Bowel habit change	13 (4.6%)	8 (2.9%)	0.281 ^b
Haematochezia	38 (13.4%)	42 (15.0%)	0.581 ^b
Constipation	19 (6.7%)	22 (7.9%)	0.594 ^b
Diarrhoea	42 (14.8%)	34 (12.1%)	0.358 ^b

SD: Standard deviation. ^aIndependent t-test. ^bPearson Chi-square.**Table II: Colonoscopy outcomes.**

	Video group (284)	Non-video group (280)	p-value
Cecal intubation rate, n (%)	284 (100%)	279 (99.6%)	0.313 ^a
Cecal intubation time, mean \pm SD, minutes	6.1 \pm 1.6	6.4 \pm 1.9	0.047 ^b
Adenoma detection rate, n (%)	75 (26.4%)	65 (23.2%)	0.380 ^a
Polyp detection rate, n (%)	90 (31.7%)	85 (30.4%)	0.732 ^a
Carcinoma, n (%)	5 (1.8%)	3 (1.1%)	0.489 ^a
Inflammatory bowel disease, n (%)	7 (.5%)	5 (1.8%)	0.576 ^a
Chronic enteritis, n (%)	3 (1.1%)	4 (1.4%)	0.690 ^a
Others, n (%)	6 (2.1%)	5 (1.8%)	0.779 ^a
Normal, n (%)	98 (34.5%)	113 (40.4%)	0.151 ^a

SD: Standard deviation. ^aPearson Chi-square. ^bIndependent t-test.**Table III: The quality of bowel preparation, satisfaction, and safety of patients.**

	Video group (284)	Non-video group (280)	p-value
Right-side colon, mean \pm SD	2.4 \pm 0.6	2.3 \pm 0.6	0.022 ^a
Transverse colon, mean \pm SD	2.4 \pm 0.5	2.3 \pm 0.6	0.026 ^a
Left-side colon, mean \pm SD	2.4 \pm 0.6	2.3 \pm 0.5	0.033 ^a
Total BBPS score, mean \pm SD	7.2 \pm 1.2	6.9 \pm 1.4	0.003 ^a
Total BBPS score \geq 6, n (%)	270 (95.1%)	252 (90.0%)	0.022 ^b
Satisfaction, n (%)			0.048 ^b
Very high	20 (7.0%)	8 (2.9%)	
High	75 (26.4%)	71 (25.4%)	
Moderate	178 (62.7%)	178 (63.6%)	
Low	8 (2.8%)	18 (6.4%)	
Very low	3 (1.1%)	5 (1.8%)	
Adverse events, n (%)			
Nausea, n (%)	10 (3.5%)	17 (6.1%)	0.156 ^b
Vomiting, n (%)	20 (7.0%)	28 (10.0%)	0.208 ^b
Bloating, n (%)	29 (10.2%)	35 (12.5%)	0.392 ^b
Dizziness, n (%)	15 (5.3%)	14 (5.0%)	0.88 ^b
Headache, n (%)	10 (3.5%)	11 (3.9%)	0.8 ^b

SD: Standard deviation; BBPS: Boston Bowel Preparation Scale. ^aIndependent t-test. ^bPearson Chi-square.

DISCUSSION

Adequate bowel preparation usually leads to successful diagnostic and therapeutic colonoscopy in clinical practice. This study presented a sufficient evidence for improvement in bowel cleansing by educational videos. Although this study did not demonstrate any effect in ADR, PDR, and other findings, the insertion time in the video group was shorter than the non-video group. In addition, compared with the non-video group, reinforced video did improve the satisfaction of patients.

Bowel cleansing is an important indicator of colonoscopy. Researchers tried to identify the optimal methods for enhancing the quality of bowel preparation, such as various bowel cleansing agents, split dose or single dose, and several approaches to increase the patient's compliance.¹⁷⁻¹⁹ But, the quality of bowel cleansing is mainly related to adherence to the instructions for diet and ingestion of purgatives, which is the basis of an optimal colonoscopy. European Society of Gastrointestinal Endoscopy (ESGE) also recommends the use of enhanced instructions for bowel preparation (i.e. telephone or short message service, social media

applications). Enhanced video is one of the methods to improve the patients' knowledge regarding bowel preparation.

Over the past ten years, several randomised controlled trials have focused on the impact of educational video on bowel preparation as compared to the conventional instruction. These include studies by Prakash *et al.* in 2012,²⁰ Park *et al.* in 2016,¹⁰ Rice *et al.* in 2016,¹¹ Jeon *et al.* in 2019,²¹ and Wen *et al.* in 2022.¹² Among these five studies, sample size varied from 92 to 950.^{12,20} Two of them emphasised the impact of adherence to bowel cleansing regimens,^{10,20} two focused on diet guidelines and ingestion of purgatives,^{12,21} and one evaluated enhanced video on clear liquid diet.¹¹ Compared with these studies, the present authors applied a same-day bowel preparation for patients undergoing afternoon colonoscopy, which could minimise the impact of sleep.²² Regarding colonoscopy outcomes, ADR and PDR were higher in video group in the study of Wen *et al.*,¹² whereas there were no statistical differences of ADR and PDR in this study, even if better bowel preparation was found in the video group. To the best of authors' knowledge, adequate bowel preparation is associated with a high adenoma detection rate. An increase of at least 1 point in total BBPS score (7-9 *versus* 6) and 1 point in segmental score (3 *versus* 2) had been found to improve ADR and PDR.^{23,24} However, it is still unclear whether a slight improvement of BBPS score will result in a statistically significant difference in ADR and PDR. The difference of total BBPS score (7.2 vs. 6.9) and segmental score (2 vs. 2) between both groups in this study might be not powerful enough to detect the difference in ADR and PDR.

Interestingly, Jeon *et al.* reported a lower PDR and ADR in the reinforced group.²¹ It was speculated the results were related to significant differences in mean age and withdrawal time in their study. Regarding the quality of bowel preparation, this study's results were consistent with the previous study except for the study of Rice *et al.*, which included a small sample of subjects and designed a video focusing solely on diet.¹¹ This study also demonstrated that reinforced education is helpful for patients' satisfaction.

The first strength of this study was that it was prospective, endoscopist-blinded, randomised, controlled study with a large sample. Secondly, same-day bowel preparation was used for patients to minimise the impact of sleep. In addition, the video was easy to be obtained for free from access link through WeChat and was conveniently understood. However, there were several limitations in the study. First, the analysis was not stratified by age as the impact on the older individuals may be slight whereas the influence on the younger individuals was stronger. Second, the information regarding whether the patients viewed the video or not was not recorded due to the rules of blinding. This condition may exist more frequently in elderly patients although a younger

family member was contacted to help them. It may also result in potential bias. Finally, the results may not be suitable to generalise because the trial was conducted in one institution.

CONCLUSION

The educational video *via* WeChat did not offer benefits on ADR and PDR, but improved the quality of bowel preparation and patients' satisfaction. Future studies are needed to investigate the impact of reinforced educational videos on older patients because ADR increases gradually with age.

ETHICAL APPROVAL:

The study was approved by the Human Ethics Committee of Xiantao First People's Hospital affiliated to Yangtze University, Hubei, China (No. 201913, dated 2019.12.10).

PATIENTS' CONSENT:

Informed consents were obtained from all patients for performing the test and publishing the data.

COMPETING INTEREST:

The authors declared no competing interest.

AUTHORS' CONTRIBUTION:

XL, WY: Design, acquisition and analysis of data, and writing of the manuscript. Contributed equally at all stages of the manuscript preparation.

HZ, WL, GX: Interpretation and discussion of results.

YL: Revision and final approval of the final manuscript.

All authors approved the final version of the manuscript to be published.

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