

Magnetic Resonance Cholangiopancreatography (MRCP) Images after Black Tea Consumption

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ABSTRACT

Aim: To evaluate black tea consumption as a negative contrast agent for better imaging of MRCP.

Study design: Prospective study.

Place and duration of study: Department of Radiology, JPMC Karachi from 1st January 2022 to 30th June 2022.

Methodology: One hundred healthy individuals, who volunteered for this research, were provided an informed written consent to sign before their study enrolment. Tea bags from 3 different tea bag companies were used. The efficacy of improvement of MRCP image as a consequence of tea consumption was further noted by a standard procedure. The intensity of signals was measured by circular-ROI (1cm²). The intensity signal was based on noise and measured as signal void. The MRCP results were taken before tea intake after 5 minutes of tea intake and up to 15 minutes were performed. The results were observed through MRCP images.

Results: Comparison of visibility in the distal part of the common bile duct by VAS and Likert method showed significant differences before and after the tea consumption and showed better image quality after tea consumption. Comparisons of duodenum and stomach according to VAS and Likert methods were statistically significant.

Conclusion: Significant results were obtained after the consumption of black tea for better quality MRCP imaging.

Keywords: MRCP; Tea consumption, Better quality imaging; Gastrointestinal system

INTRODUCTION

Magnetic resonance Cholangiopancreatography is considered a non-invasive detection and imaging method for the evaluation and estimation of the pancreaticobiliary system¹⁻³. It is mainly based on T2-weighted sequences⁴. Stomach and duodenum fluid cause hurdles in the evaluation of biliary and pancreatic ducts, mimic certain lesions, and interfere with clear results and depictions^{4,5}. This issue can be avoided by fasting before the exam and using negative oral contrast agents⁵⁻⁷. These agents help decrease the T2W high signal from the intestine and gastric fluid and also shorten T2 relaxation time^{8,9}. Blueberry and pineapple juices are mainly used as negative contrast agents, but some are unavailable in a few countries. Despite this, unwanted signals are occasionally detected.

Blueberries are difficult to consume in large quantities due to their high cost and occasional scarcity. Before MRCP protocol, few studies looked into the role of black tea consumption and its effects¹⁰. Rosella flower tea was used for this purpose. Tea is made from *Camellia sinensis* leaves, and it is considered the most common drink after water in the world¹¹. Because of its high mineral content, particularly manganese, low cost, and use as a negative contrast agent for MRCP¹².

The present study was designed to evaluate the use of black tea as a negative oral contrast agent in the MRCP protocol. The result of the present study would also prove beneficial for low-income countries or countries where a large quantity of blueberries is difficult to obtain.

MATERIALS AND METHODS

This prospective study was conducted in the Department of Radiology, JPMC Karachi from 01st January 2022 to 30th June 2022 and 100 volunteers were enrolled. Ethical approval from the institutional review board was taken for it. The study participants were provided an informed written consent to sign before their study enrolment, as they were healthy individuals who volunteered for this research. The age of the participant was between 25-45 years with an equal number of males and females. Five flavourless tea bags were boiled for 10 minutes in water. Tea bags from 3 different tea bag companies were used for this purpose. The efficacy of improvement of MRCP image as a consequence of tea consumption was further noted by a standard procedure. Initially, only 15 ml of tea was consumed by volunteers. The intensity of signals was measured by circular-ROI (1cm²). The intensity signal was based on noise and measured as signal void. The protocol of

MRCP included the usage of 12 radial slabs with a size of 40mm as well as 20mm and a thickness of 10° as the angle of the internal slab. Fifty percent of slabs were overlapping with a coronal-oblique 20mm thickness. The study intensity signal were measured through the electronic film workstation in addition to circular ROI. After the initial 200-300ml tea was given to volunteered patients, where for making it tolerable 40 g sugar was also added in it. The MRCP results before, after 5 minutes of tea intake, and up to 15 min were performed. The results were observed through MRCP images. The improvement of visibility was noted and statistically analyzed through SPSS version 26.0 using mean and standard deviations. Two used scales were the Likert¹⁴ scale and visual-analogue scale (VAS)¹⁵ score the value for the MRCP visibility.

RESULTS

There were 50 males and 50 females with the mean age of the participants being 35 years. Comparison of visibility in the distal part of the common bile duct by VAS and Likert method showed significant differences before and after the tea consumption and showed better image quality after tea consumption. Other anatomical parts did not show any significant scores difference in the gall bladder and proximal part of the bile duct before and after tea consumption (Tables 1-3).

Table 1: VAS and Likert scores before, 5 and 15 minutes of tea consumption

Different imaging	Method of Assessment	Mean±SD
GB before.	Likert	3.5±0.6
	VAS	86.1±13.
GB at 5min	Likert	3.5±0.61
	VAS	86.4±15.7
GB at 15 min	Likert	3.7±0.5
	VAS	86±13.6
CD prior	Likert	2.8±1.0
	VAS	61.5±18.4
CD at 5 min	Likert	2.8±0.81
	VAS	62.6±16
CD at 15 min	Likert	2.8±0.7
	VAS	66.6±17.6
Distal CBD & AMP prior	Likert	2.1±1.1
	VAS	48.4±22
Distal CBD & AMP at 5 min	Likert	2.4±1.1
	VAS	53.5±23
Distal CBD & AMP at 15min	Likert	2.5±1.2
	VAS	54.45±24.2
MPD prior	Likert	2.32±1.1
	VAS	51.5±26.1
MPD at 5 min	Likert	2.61±1.2
	VAS	57.2±25.3
MPD at 15 min	Likert	2.8±1.2
	VAS	59.8±26.7

Despite high-quality signals in the gastrointestinal tract, categorizations were made of important parts including the first three sections of the duodenum and the stomach. The evaluation

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was again performed by VAS and the Likert scoring method. Comparisons of all the parts according to VAS and Likert methods were statistically significant. It proves that all the bright areas and signals were significantly obliterated after tea consumption (Fig 1).

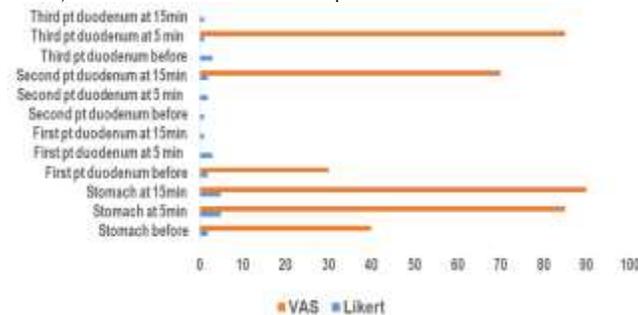
Table 2: VAS and Likert scores before, 5 and 15 minutes of tea consumption

Different imaging	Method of Assessment	Mean±SD
Proximal CBD prior	Likert	3.9±0.6
	VAS	89.2±13.5
Proximal CBD at 5 min	Likert	3.9±0.6
	VAS	89.4±12.8
Proximal CBD at 15 min	Likert	3.8±0.6
	VAS	89.5±13.0
CHD prior	Likert	3.7±0.81
	VAS	87.5±20.4
CHD at 5 min	Likert	3.72±0.81
	VAS	88.4±19.6
CHD at 15 min	Likert	3.7±0.91
	VAS	86.9±20.8
IHD prior	Likert	2.91±0.72
	VAS	69.5±14.3
IHD at 5 min	Likert	2.91±0.72
	VAS	69.8±14.7
IHD at 15 min	Likert	3±0.8
	VAS	70.4±14.6

Table 3: VAS and Likert scores before, 5 and 15 minutes of tea consumption

Imaging sessions	Assessment method	Mean±SD
Distal CBD & AMP prior	Likert	2.2±0.91
	VAS	48.4±22.1
Distal CBD & AMP at 5 min	Likert	2.31±1.2
	VAS	53.5±22.8
Distal CBD & AMP at 15min	Likert	2.4±1.1
	VAS	54.5±24.2
MPD prior	Likert	2.31±1.12
	VAS	51.5±26.3
MPD at 5 min	Likert	2.7±1.11
	VAS	57.5±25.2
MPD at 15 min	Likert	2.8±1.4

Fig 1: Likert and VAS scores according to bright signals of gastrointestinal parts before, 5 and 15 minutes of tea consumption



DISCUSSION

Magnetic resonance Cholangiopancreatography is a method that is commonly used for the purpose of evaluating the morphological characteristics of the pancreatic and biliary channels. Because it is a non-invasive imaging technology, its utilisation is generally regarded as being risk-free¹⁻³. In order to avoid producing false results and MR artefacts, this approach requires the use of a negative oral contrast agent. Signals from the gastrointestinal tract can be challenging, particularly when one has to produce a thick slice image¹³. These contrast agents are extremely sensitive to the quantities of various metal ions, particularly manganese and iron, which both possess both supermagnetic and paramagnetic characteristics^{14,15}.

As a negative contrast agent, the tea was utilised to decrease T2W fluid high signals and lessen the amount of blurring

in the photos. The assessment relied on the Likert scale as well as the VAS scoring system. After drinking the tea, the researchers found that they could see significant improvements. When contrasted with the more proximal portion of the common bile duct, the distal portion of the CBD demonstrated a statistically significant deviation. In a separate piece of research, using blueberries led to the discovery of a statistically significant difference^{16,17}.

After using a negative oral contrast, good visualisation of various areas of gastrointestinal tract was achieved; nevertheless, clear pictures of a certain portion of the biliary tract may be difficult to get. Before administering a contrast agent, a thorough evaluation of the patient's medical history is required. If the patient has a previous history of endoscopic sphincterotomy, it is not recommended that it be administered first because of the potential for bile counter flow.

CONCLUSION

Black tea is a safe, efficient, and affordable negative oral contrast agent for MRCP. This suppresses the T2W high signal of fluid in GI tracts and showed better/high-resolution images of the distal part of the common bile duct.

Conflict of interest: Nothing to declare

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