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Utilization of dates extract to suppress stomach and duodenal signal on magnetic resonance cholangiopancreatopgrapy (MRCP)

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ABSTRACT

The result of the image of the biliary system on MRCP examination is often disturbed by artifacts due to signal from the stomach and duodenum. To eliminate the gastric and duodenal signal artifacts is required an intra oral negative contrast medium. There are commercial negative contrast media in the market, but this contrast media is expensive and limit of stock. Dates extract has a substance that is paramagnetic in iron material form so it can be used as a substitute for negative contrast media sold on the market.

This type of research was quasi experimental with pre-test and post-test design. The research subjects used 10 samples of healthy volunteers that scanned pre and post contrast 100 ml dates extract administer. T2 HASTE Fat Saturation Thick Breath Hold Rotation was used as scanning protocol. Image score was assessed by 3 Radiologist. Statistical data were tested using Wilcoxon and Friedman Test.

The result showed that there were differences suppression rate of the gastric signal between pre contrast and post contrast. There is no difference in the level of duodenal signal suppression between pre contrast and post contrast.

Administration of 100 ml dates extract to MRCP patient could suppress stomach signal but not for duodenal signal.

Keywords: *MRCP, HASTE, Dates extract, Negative contrast media.*

INTRODUCTION

Bile stone system disease is one of the major causes of abdominal area morbidity and mortality. Gallstones are a chronic recurrent hepatobiliary disease, based on disturbed cholesterol metabolism, bilirubin and bile acids, caused by gallstone formation in the bile ducts of the liver, common bile ducts, or gallbladder.

The main abnormality that can arise in the gallbladder is the formation of stones. Gallstone disease is an important health problem in the United States and Europe with a prevalence of around 10-15%. Gallstones are commonly found inside the gallbladder, but they can also migrate through the cystic duct into the bile duct into bile duct stones [1].

Bile system stone disease can cause complications, including acute cholecystitis, acute pancreatitis, and acute cholangitis. The risk of developing gallbladder cancer is even greater in

patients suffering from gallstones, more than 25% [1].

Magnetic Resonance Cholangio Pancreatography (MRCP) is an examination technique using magnetic fields without using contrast media, instruments and ionizing radiation. In MRCP the bile duct will be seen as a bright structure because it has high signal intensity while gallstones will be seen as low signal intensity. MRCP has sensitivity between 91% to 100%, specificity values between 92% to 100% and positive predictive values between 93% to 100% in conditions with suspected bile duct stones. High diagnostic values make MRCP more frequently used in diagnostic management especially bile duct stones [2]. MRCP has several advantages compared to ERCP where MRCP is a riskless bile duct imaging associated with instrumentation, contrast media and ionizing radiation [2].

Occasionally in MRCP imaging there is overlapping between the signals from the pancreatobilliary and signals from the gastrointestinal tract (stomach, duodenum and proximal intestine) which can obscure the pathology [3]. To overcome these problems, one alternative is used oral contrast media with the aim to shorten T2 relaxation time. Some oral contrast media are available on the market for MR examination of the abdomen and pelvis including dimeglumine Gadopentate, ferric ammonium citate, manganese chloride, Kaolinate, antacids, barium sulphate and ferric particles. Some of them have bad taste, little availability in the market and the price is relatively expensive [3].

Gastro-intestinal contrast media are usually classified based on changes in signals on MRI images that are positive, negative and biphasic. Positive contrast media is a contrast medium that can increase signal intensity in the intestinal lumen. Negative contrast media is a contrast medium that can reduce signal intensity in MRI images [4]. Negative oral contrast media contain super-paramagetic iron oxides (SPIOs) particle material. Some of these are per fl uoroctyl bromide, ferumoxide oral suspension, and oral magnetic particles [5]. Negative contrast media has the property of reducing signal intensity at T2 weighting, especially T2* weighting.

Alternative ingredients that can be used for negative oral contrast media on MRCP examination must contain both manganese and iron (Feric). One ingredient that has high iron content is dates. Dates are the result of processed dates that have an iron content of 1.5 mg per fruit. Besides that it has good taste and is loved by all age groups [6, 7].

Dates (Phoenix Dactylifera) are palm-like trees that grow in the Arab, Iraq and surrounding areas. Many are found in deserts (dry) and can reach 30-35 meters high. Oval shaped palm fruit 2 - 7.5 cm in various colors between dark brown, reddish, light yellow and seedy [7]. Date palm has many benefits, one of which is as a source of iron which is a component of haemoglobin in blood cells.

Dates extract are dates that are mashed and extracted. This date extract is liquid with thick consistency, black and sweet and contains complete nutrients such as dates that have an iron content of 1.5 mg per fruit. Besides that it has good taste and is loved by all age groups [6, 7]. This iron content is used as an alternative to oral contrast media to suppress gastric and duodenal signals.

SUBJECT AND METHODS

Subject

The study was conducted by giving two treatments for 10 healthy volunteers in the MRCP scanning, pre-contras and posts-contrast. Pre contrast is **scaning** without dates extract administer, while post contrast is scaning after giving 100 ml dates extract with 15 minute scan delay. Before scanning, volunteers were asked for 14-hour dietary fat and 6-hour fasting and informed consent. Volunteers used were volunteers who did not have a history of gastrointestinal, liver and biliary system disease, and patients who were not in pregnant.

Oral Contras Agent

The oral contrast agent used was 100 ml of dates extracts, which were given 15 minutes before the post contrast scaning.

MRCP Protocols

The MRCP protocol used includes 3 Plane Localizer and T2 HASTE Fat Saturation Breath Hold Rotation using MRI Siemens Aera 1.5 T.

Image assessment

The image was assessed by 3 radiologists as respondents to assess the degree of suppression of gastric and duodenal signals. Assessment is done

with 4 levels of assessment (1 is bad, 2 is enough, 3 is good, 4 is good). The data then analyzed statistically using SPSS with the Wilcoxon test.

RESULTS

The sample in the study were 10 healthy volunteers with 6 men (60%) and 4 women (40%) with an age average is 21.8 and body mass index 22.53.

To determine the effect of dates extract orally as a negative oral contrast medium on gastric and duodenal signal suppression, the results of 10 volunteer radiographs which included pre-contrast, post contrast were observed to respondents who were radiology specialists. Respondent's assessment the level of density of the stomach and duodenum which consists of poor, sufficient, good and very good assessment. The distribution of respondents' assessment results on radiographic images related to the level of gastric and duodenal signal suppression is presented in Table 1.

Table 1: Respondent Image Assessment Result of pre and post dates administer of MRCP Images.

	Criteria	N	Percentase	P Value
Stomach				
Pre Contrast	Poor	19	63,3	0.042
	Enough	3	10	
	Good	3	10	
	Very Good	4	13,3	
Post Contrast	Poor	13	43,3	
	Enough	3	10	
	Good	8	26,7	
	Very Good	6	20	
Duodenum				
Pre Contrast	Poor	8	26,7	0.985
	Enough	7	23,3	
	Good	9	30	
	Very Good	6	20	
Post Contrast	Poor	3	10	
	Enough	15	50	
	Good	8	26,7	
	Very Good	4	13,3	

From table 1, the distribution of the assessment of gastric signal suppression with the most poor criteria was 63.3% of pre-contrast image and poor evaluation criteria on the dates extract administer image (26.7%) and good and very good criteria for suppression of gastric signals increases in dates extract administer image. While the respondents' assessment of the quality of suppressing duodenal signals with good and very good criteria tends to be the same.

Statistical test results showed that there was a difference in gastric signal suppression between pre contrast and 15 minutes post contrast delay (p value 0.042). While the results of statistical tests on duodenal signal suppression showed no difference between pre-contrast and post-contrast (p value 0.985).

DISCUSSION

The dates extract used has a thick, brown shape, tastes sweet and is wrapped in a bottle. The iron content in the date palm extract is used as an alternative media to replace commercially negative oral contrast media in which one of the ingredients used is Super Paramagnetic Iron Oxides (SPIOs). Extracts of dates used tend to be safe. Volunteers after being treated and evaluated up to 2 days after treatment were not found any complaints.

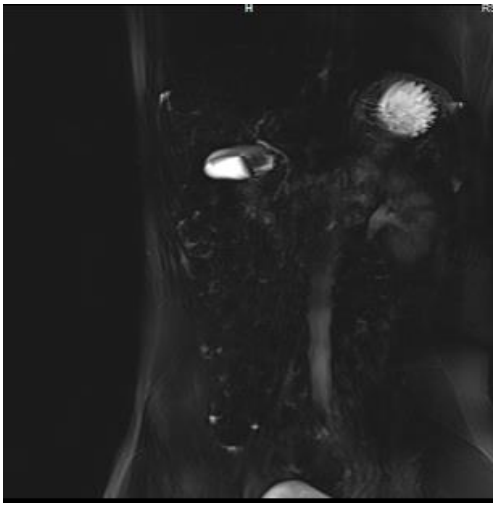

Figure 1. Pre administer of dates extract

Figure 2. Post administer of dates extract

There is a difference in suppression of gastric signal intensity between before and after administration. The intensity of the gastric signal has decreased the level of intensity (to be more hypointense) in post contrast image. Decrease in the level of intensity occurs due to the iron content in the dates extract that have paramagnetic properties. This is because the paramagnetic properties of iron will shorten T2 relaxation time. Short T2 relaxation time causes the image of the gastric image to become darker or hypointens. Research conducted by Riordan used pineapple juice with manganese content of 2.76 mg / dL and the content of oolong tea used in the research of Fatimah contained 0.9 mg showed a decrease in gastric signal [3, 8].

While the duodenal picture does not show any difference in signal intensity between before and after treatment. This happens because the concentration level of extract dates is higher causing the duration of the process of extracting dates from the stomach to the duodenum. The journey of food out of the stomach to the duodenum does not begin immediately. The food must be in a liquid condition then gradually walk through the pylorus into the duodenum.

Inside the extract dates there are various substances other than iron. But the substances that influence the image are just iron substances. Other substances have no effect on the resulting image. However, other substances contained in dates extract have benefits as nutritious and good supplements for the body.

CONCLUSIONS

There is a difference in MRCP image between before and after giving extracts of dates as an alternative to oral negative contrast media to the picture of gastric signal suppression (p value = 0.042). But there was no difference between before and after extracting dates as an alternative to oral negative contrast media to the description of duodenal signal suppression (p value> 0.05).

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