Benefits of Slow Deep Breath in Relief Pain Associated with Cholelithiasis and Cholecystitis: Comparative Study

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ABSTRACT

Background: Cholelithiasis (gallstone disease) harasses about 10%– 20% of the adults globally and is among the hepatobiliary diseases associated with the highest socioeconomic costs. In addition, cholelithiasis is also an important risk factor of gallbladder cancer.

Purpose: To find out when the benefit of slow deep breath is more in relieving the pain of cholelithiasis or cholecystitis.

Methodology: A clinical trials study carried out in Iraq; the study initiated from the period of June 2021 to May 2022, A simple random sampling method of 60 patients was included in this study, divided in to 3 groups, 20 patients for each group. These three groups are control, cholelithiasis, and cholecystitis group.

Results: Most of patients were at age of 20- 39 years, female, and suffering from overweight and obesity class I. There were differences between pain levels among the three different groups, 70% of patients were suffering from severe pain in control group while after implementing slow deep breath become pain level of three groups as follow, 25% of patients suffering from severe pain in cholelithiasis group and 40% of patients suffering from severe pain in cholecystitis group.

Conclusion: This study concludes that the implemented of slow deep breath exercises had benefit to decrease the pain that associated with cholelithiasis and not effect on pain with cholecystitis.

Keywords: Cholecystitis, Cholelithiasis, Slow deep breath

INTRODUCTION

Cholecystitis is caused by inflammation of the gallbladder due to blockage of the cystic duct by a gallstone. The term choledocholithiasis is used on gallstone enters the common bile duct. This can result in cholangitis, which is inflammation of the bile duct. Gallstone pancreatitis is inflammation of the pancreas caused by blockage of the pancreatic duct by a gallstone. Complicated gallbladder disease refers to acute cholecystitis, cholelithiasis, cholangitis, and/or gallstone pancreatitis[1].

Uncomplicated gallbladder disease is defined as presence of gallstones without complications such as obstruction or inflammation. Symptomatic gallbladder disease refers to biliary colic or pain as a result of gallstone formation. Asymptomatic gallbladder disease refers to gallstones that are present but remain in the gallbladder, are not obstructive, and do not cause discomfort[2].

Slow, deep breathing can increase vagal afferent signaling at different levels. Deep breathing increases stimulation of the pulmonary stretch receptors and afferent signaling, which mainly run in the vagus nerve and give inputs to the nucleus of the solitary tract in the brain stem. They also synapse with ascending circuits terminating at subcortical and cortical levels (eg, insular cortex and amygdala) and contribute to sensory, emotional, and cognitive processing of the respiratory signals[3]. Slow, deep breathing can also increase vagal afferent signaling via phasic stimulation of the arterial baroreceptors by augmenting fluctuations of blood pressure at slow frequency[4].

Baroreceptors are mechanoreceptors mainly located in the aortic arch and carotid sinus. The baroreflex is responsible for rapid control of arterial blood pressure; an increase in blood pressure increases baroreceptors afferent signaling which is transmitted via the carotid sinus and aortic depressor nerves (branches of the glossopharyngeal and the vagus nerves, respectively) to the nucleus of the solitary tract. This ultimately leads to sympatho inhibition and increased cardiac vagal output, which result in a decrease in heart rate and blood pressure[5]. The nucleus of the solitary tract has direct and indirect projections to several brain areas involved in pain regulation (eg, periaqueductal gray and locus coeruleus)[6].

Several animal and human studies using different methods of baroreceptors and vagus nerve stimulation have found hypoalgesic or antinociceptive effects[7,8].

METHODOLOGY

A clinical trials study carried out in the surgical wards at Imam Al-Hussein Medical City in Holy Karbala, Iraq; the study initiated from the period of June 2021 to May 2022, to find out when the benefit of slow deep breath is more in relieving the pain of cholelithiasis or cholecystitis. A simple random sampling method of 60 patients was included in this study, divided in to 3 groups, 20 patients for each group. These three groups are control, cholelithiasis, and cholecystitis group. The pain level measured initially and then carried out the interventional protocol that was consisted of the follows

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steps:

- Inhale slowly and evenly through the nose until the greatest chest expansion is achieved.
- Hold your breath for 2 to 3 seconds.
- Then exhale slowly through the mouth.
- Continue exhalation until maximum chest contraction has been achieved.
- Repeated these steps 5 times (Berman et al.9)

Measured the pain level of pain two times for each group (before and after application of slow deep breath) as special pain scale (visual analogue pain scale). The data collected was analysis by spss v. 26. We are using Paired samples test to find out the significance of benefits of application of slow deep breathing among patients with cholelithiasis and cholecystitis.

RESULTS

Table 1: Distribution of socio-demographic characteristics of patients

Socio-demographic Characteristics		Control group		Cholelithiasis		Cholecystitis	
		F.	%	F.	%	F.	%
Age	< 20 years	2	10	3	15	2	10
	20- 39 years	12	60	13	65	14	70
	40-59 years	6	30	4	20	4	20
	Total	20	100	20	100	20	100
Gender	Male	8	40	7	35	6	30
	Female	12	60	13	65	14	70
	Total	20	100	20	100	20	100
Body mass index	Normal weight	3	15	3	15	3	15
	Over weight	5	25	8	40	7	35
	Obesity class I	7	35	6	30	8	40
	Obesity class II	5	25	3	15	2	10
	Total	20	100	20	100	20	100

This table show that the 60% of control group, 65% of cholelithiasis group, and 70% of cholecystitis group were at age of 20- 39 years. 60% of control group, 65% of cholelithiasis group, and 70% of cholecystitis group were female. 25% of control group, 40% of cholelithiasis group, and 35% of cholecystitis group were suffering from overweight, while 35% of control group, 30% of cholelithiasis group, and 40% of cholecystitis group were suffering from obesity class I.

Table 2: Distribution of patients according level of pain after slow deep breath application

Pain level	Control group		Cholelithiasis		Cholecystitis	
	F.	%	F.	%	F.	%
Mild	2	10	7	35	7	35
Moderate	4	20	8	40	5	25
Sever	14	70	5	25	8	40
Total	20	100	20	100	20	100

This table reported that, there were differences between pain levels among the three different groups. A 70% of patients were suffering from severe pain in control group while after implementing slow deep breath become pain level of three groups as follow, 25% of patients suffering from severe pain in cholelithiasis group and 40% of patients suffering from severe pain in cholecystitis group.

Paired samples test indicated that there was a statistical significant between level of pain in the period of before application if slow deep breath and after of it in the cholelithiasis group. also reported that there was no statistical significant in the control group and cholecystitis group. that represent that the implemented of slow deep breath exercises had benefit to decrease the pain that associated with cholelithiasis and not effect on pain with cholecystitis.

MS: mean of score, SD: stander deviation, C.S: Significancy, S: Significance, NS: non Significance.
Chi-square test exposed that there was a significant association between Improvement of pain level with age group and body mass index.

DISCUSSION

Discussion of socio-demographical characteristics of patients: The study result in table (1) showed that most participants were 20-39 years old, representing 60% of the control group, 65% in cholelithiasis group,

Table 3: Descriptive statistics of the studied groups regarding the level of pain

Variable	Period	No.	Control group				Cholelithiasis group				Cholecystitis group			
			MS	SD	P-value	C.S	MS	SD	P-value	C.S	MS	SD	P-value	C.S
Pain level	Pre test	20	2.6	.68	.33	NS	2.5	.68	.05	S	2.5	.68	.076	NS
	Post test	20	2.5	.67			1.9	.78			2.0	.88		

Table 4: Association between the effect of slow deep breath among cholelithiasis patients with their socio-demographic characteristics

Socio-demographic Characteristics		Improvement of pain level			
		MS	SD	P-value	C.S
Age	< 20 years	2.05	0.6	0.22	S
	20- 39 years				
	40-59 years				
Gender	Male	1.68	0.48	0.32	NS
	Female				
Body mass index	Normal weight	3.4	0.94	0.05	S
	Over weight				
	Obesity class I				
	Obesity class II				

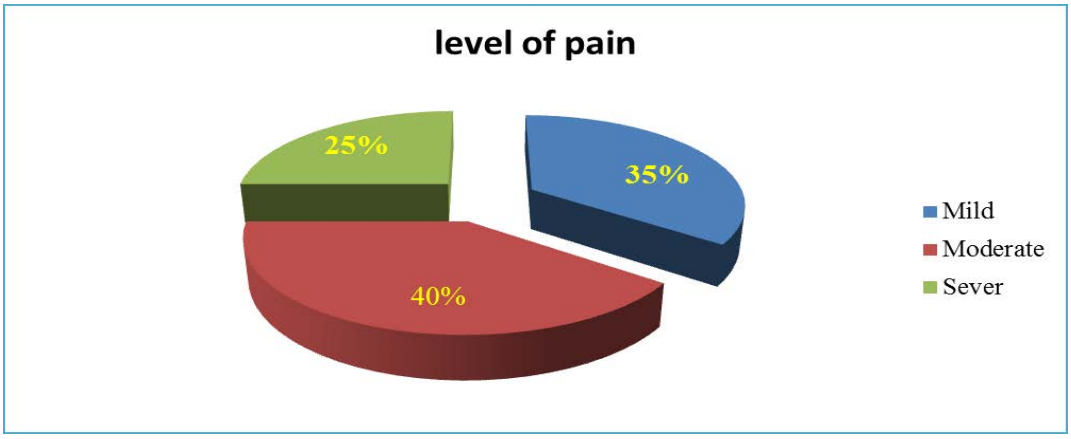

Figure 1: Distribution of patients in cholelithiasis group according level of pain after slow deep breath application

and 70% in cholecystitis group. Singh et al.[10] conducted a study was in in North Indian reported that 38.9% % of patients were 30-40 years old. As for gender, the results of this study indicated that approximately two third of the participants were female. The results of a study conducted by Doraiswamy et al.,[11] the incidence of gallstones in women is higher than in men. Finally, for BMI, this study showed that approximately third of the participants were obesity class I. The results of this study agree with a study done by Chamorro et al.,[12] shows that the rate of cholecystitis and cholelithiasis is related to a high body mass index.

Distribution of patients according to level of pain after slow deep breath application: As shown in table (2), the result in the levels of pain after implementing the protocol, the proportion of participants in the cholelithiasis group was 25%, and in the control group, 70% had a severe pain. These results are consistent with the results of a study conducted by Asman and Maifita[13] in Indonesia. The results of the study showed that slow deep breathing is effective in relieving pain.

CONCLUSION

Most of patients were at age of 20- 39 years, female, and suffering from overweight and obesity class I. The implemented of slow deep breath exercises had benefit to decrease the pain that associated with cholelithiasis and not effect on pain with cholecystitis.

RECOMMENDATION

The study recommends that patients who suffer from pain associated with gallstones should perform slow, deep breathing. Conducting more studies to find out which intervention helps relieve the pain associated with cholecystitis.

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Competing Interest: None

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