Research article (Award paper)

A study on effects of osteopathic technique in fatty liver

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ABSTRACT

Introduction and Aim: The prevalence of fatty liver is increasing worldwide and has also been observed in young adults. Fatty liver can lead to decreased liver function, which can lead to many digestive disorders and symptoms such as right upper quadrant pain, back pain, constipation, fatigue, bloating, and even loss of appetite. Liver manipulation techniques can help reduce hepatocyte inflammation, loosen the attached fascia, reduce pain, and improve liver function. The study aims to evaluate the effects of osteopathic techniques on fatty liver.

Materials and Methods: Ten participants with fatty liver were selected as per inclusion and exclusion criteria. One session per subject once a week was given for 3 consecutive weeks. Pre and post-data were analysed.

Results: The study demonstrated differences in the outcome measures pre and post-treatment. There was a significant change observed on both the outcome measures, which was statistically significant on USG and on SGOT/SGPT with p=0.05.

Conclusion: From the present study we can conclude that liver manipulation techniques are clinically effective in fatty liver conditions.

Keywords: Non-alcoholic fatty liver; alcoholic fatty liver; hepatic steatosis; non-alcoholic steatohepatitis (NASH); ultrasonography (USG); SGOT / SGPT.

INTRODUCTION

The frequency of non-alcoholic adipose liver complaints has increased in the past two decades whereas the other liver conditions have either stabilized or dropped, perfecting the quality of life. Asian Indians are at an advanced threat of developing non-alcoholic fatty liver disease (NAFLD) as they develop central rotundity rather than general rotundity and due to ethical predilection to type 2 diabetes makes the possibility of having NAFLD is veritably high in the Indian population. The frequency observed on ultrasonography for non-alcoholic adipose liver complaints was 77.99, and the rate amongst males and ladies was 80.8 and 74.4 independently. Grade 2 steatosis was the most current (61.1), followed by grade 1 steatosis (10.5), and grade 3 steatosis was the least (6.3) current (1).

Fatty liver is also known as hepatic steatosis It occurs when fat accumulates in the liver and can cause health problems. As one of the largest and most important organs in our body, the liver helps process nutrients from food and drink, filtering toxins from the blood. Excess fat in the liver causes liver inflammation and scarring in the later stages, impairing liver function. Left untreated, this scar can lead to liver failure. Fatty liver disease caused by excessive alcohol consumption is known as alcoholic fatty liver disease (AFLD). Fatty liver can occur even without alcohol. Excessive intake of triglycerides (trans fats) and excessive intake of fructose (sugar) can lead to fatty deposits in the liver, known as NAFLD. According to researchers in the World Journal of Gastroenterology, NAFLD affects 25-30% of people in the United States and Europe (2). There are two types of fatty liver. 1. Non-alcoholic fatty liver 2. Alcoholic fatty liver.

Previous studies have shown that NAFLD is not only confined to the liver, but is also harmful to multiple extrahepatic organs. Patients with NAFLD had reduced total brain volume, higher white matter hyperintensity, and more lacunar infarcts than those without NAFLD. However, most previous studies were cross-sectional and unable to assess the long-term effects of NAFLD on cognitive function (3).

Approximately 90% of morbidly obese patients present with histological abnormalities in the liver. Morbid obesity alone can manifest as alcoholic hepatitis and can lead to serious illness leading to cirrhosis and liver failure. Factors such as alcohol, type 2 diabetes, unbalanced diet, medications, and weight loss surgery also contribute to progressive liver damage. Fat accumulation alone is unlikely to stimulate inflammation and fibrosis (4).

A systematic review of the aetiology of non-alcoholic fatty liver disease. NAFLD is a major cause of morbidity and mortality, and although simple steatosis has a relatively benign prognosis, a significant proportion of patients progress to NASH, which later leads to cirrhosis with the risk of HCC. It is also shown that They also mentioned current treatment strategies for NASH. It focuses on ameliorating components of metabolic syndrome such as obesity and IR without leaving liver specific

drugs behind. However, fibrosis and further complications can be avoided by altering the pathogenesis mechanisms of NASH, which can have fruitful consequences. This information will also help improve the condition and develop therapeutic strategies, giving future researchers room for extensive experimentation (5).

NASH is a very serious type of NAFLD. With NASH, the excess fat causes the liver to become inflamed. This means that redness and swelling will occur more often. Over time, inflammation damages the liver. Approximately 2 to 6 in 100 people are predisposed and concerned about developing NASH, even though they do not drink alcohol or drink very little alcohol. About 1 in 5 adults with NASH are prone to develop severe scarring of the liver (cirrhosis). NASH can eventually lead to liver failure and death. Some people need liver transplants to extend their lives. There is a direct correlation between obesity and the prevalence and severity of NAFLD (6).

Alcoholic fatty liver is caused by long-term heavy alcohol consumption. The liver is able to break down and remove most of the alcohol consumed from the body. The process of alcohol metabolism damages liver cells, promotes inflammation and releases contaminants that weaken the body's natural defences. The more alcohol you consume, the more damage it does to your liver (7). Diet and exercise are important treatments for the majority of patients with NAFLD. Weight loss is beneficial, and the degree of liver histological improvement is directly proportional to the weight lost (8).

A study was conducted on the therapeutic effects of diet and exercise in obese patients with fatty liver. They compared the effects of a restricted diet and exercise with no treatment in obese patients with fatty liver. Twenty-five obese patients with fatty liver were divided into treatment and control groups. Fifteen obese patients underwent a diet and exercise program during the three-month study period. Ten patients did not change their diet and lifestyle during the same study period. Blood chemistries and liver histology were compared before and after in all patients. The results of the study showed that biochemical blood data such as total cholesterol, fasting blood glucose level, steatosis and body weight decreased significantly in the treatment group after the test. No significant difference was observed in the control group after the test (9).

In summary, the liver is the most common place for fat to accumulate as it plays a central role in lipid metabolism. Depending on the cause and extent of accumulation, fat changes can be mild and reversible, or severe leading to irreversible cell damage and death (10).

Fatty changes in the liver can be caused by one of two types of causes:
Excess fat is a condition in which the liver's ability to metabolize fat is exceeded e.g., i) Obesity ii) Diabetes mellitus iii) Congenital hyperlipidaemia.

A condition in which fat is not metabolized due to liver cell damage. i) alcoholic liver disease (most common) ii) starvation iii) protein-calorie malnutrition iv) chronic disease (e.g., tuberculosis) v) acute fatty liver in late pregnancy vi) hypoxia (e.g., anaemia, heart failure) vii) hepatotoxins (e.g., carbon tetrachloride, chloroform, ether, aflatoxin and other toxins) viii) drug-induced hepatocellular injury (e.g., administration of methotrexate, steroids, CCl4, halothane anaesthesia, tetracycline, etc.,) ix) Reye's syndrome (10).

Causes of Fatty liver by Eric Hebgen in visceral manipulation in osteopathy book

- Alcohol abuse
- Adiposity
- Diabetes mellitus
- Pregnancy
- Toxins, e.g., poisonous mushrooms
- Liver damage from alcohol
- Fatty liver
- Steatosis hepatitis or acute alcoholic hepatitis with signs of liver insufficiency to the point of liver failure with- Pressure pain in the liver, nausea, and also weight loss, fever, icterus, ascites, hepatosplenomegaly, encephalopathy.
- Alcoholic liver cirrhosis
- Cirrhosis of the liver:

irreversible changes in normal liver tissues with fibrosis and destruction of the physiologic microscopic lobe structure.

Causes

- Alcohol
- Cystic fibrosis
- Chronic right cardiac insufficiency
- Medications. Common symptoms are fatigue, poor performance, nonspecific upper abdominal pain, and cachexia (11).

Osteopathy

Osteopathy was developed by Dr A. T. Still, who argued that ‘natural blood flow is healthy’ and the disease is an effect of local or global blood distribution, in which nerve excitation causes muscle contraction, squeezing venous blood flow to the heart, and bones are affected by nerves, veins, and arteries.

There are four principles of osteopathy:

- The body functions as a whole unit
- The body has a self-healing capacity
- The structure and functions are interrelated
- The role of the artery is supreme (12).

Osteopathy is the manual examination and the treatment method is the integrated musculoskeletal Visceral and Cranio-sacral system. Visceral osteopathy deals with the cure of reproductive system dysfunction, hepatic system, gastrointestinal system, urinary system, etc. In this study, Visceral Osteopathy will be extensively studied.

Visceral osteopathy

Jean Pierre Barral and Pierre Mercier put this hypothesis of viscera that is, all viscera have a physiologic motion when they are in good health. Motions are named visceral mobility, motility, and motricity which was given by Hebgen (10). Restrictions, Fixations, or Adhesions of the visceral structures to one another or surrounding structures lead to repetitive dysfunctions of motion and can affect the organ and related structures, not only structurally but also functionally (13).

Osteopathic treatment of liver disease is described in the osteopathic literature. In his book, Eric Hebgen, author of Visceral Manipulation in osteopathy, presents liver manipulation techniques that improve the overall physiological and metabolic function of the liver (11). There does not appear to be much research done to prove the effectiveness of osteopathic techniques in improving liver conditions. Educating the public and other therapists/physicians about the benefits of osteopathic treatment is critical to the future of osteopathy, the researchers say. Osteopathic treatment of the liver improves liver function and quality of life (14).

Since there are not many research articles published on the effects of osteopathic techniques on Fatty Liver, this study is intended to know the effects of osteopathic liver intervention on Fatty Liver

MATERIALS AND METHODS

Study design

The research done is an Experimental study in which subjects with Fatty Liver were assessed and treated in the span of 3 months. Pre and post-readings were taken to rule out the result.

Subjects

Source: Subjects for the study were taken from in and around Sri Sri University.
Sample size: 10 subjects were taken for the study.

Inclusion criteria

- Both genders, male and female
- Age between 20-50 years
- Overweight and obese people with Fatty Liver symptoms
- Alcoholics with symptoms of Fatty Liver
- Grades 1 and 2

Exclusion criteria

- Abdominal tumours
- Liver Cancer
- Grades 3 and 4
- Recent abdominal surgeries
- Psychiatric patients
- Pregnancy
- Paediatric fatty liver patients
- Hepatitis
- Cirrhosis
- Diabetes mellitus

Sampling technique

Subjects who approached diagnosed fatty liver were included in the study. A convenient sampling technique was used to select the subjects for the study.

Procedure

The study was conducted in the Department of Osteopathy, SSU Cuttack of Odisha. Ambulatory patients with fatty liver conditions were included in the study considering the inclusion and exclusion criteria. The session was given for 3 weeks i.e., 1 session per week per patient for 3 consecutive sessions. Brief clinical history and examination along with some epidemiological data were taken. Pre and Post-treatment results were taken.

Osteopathy techniques

The direct and indirect techniques by Barral, liver pump, liver recoil technique followed by listening of the liver (Motility treatment) All these techniques will help in releasing the fascia around the liver providing free mobility of the liver with its surrounding structures.

Also, it will improve circulation to the liver and help it regain its physiological state.

RESULTS

Table 1: General demographic data

	Age	**Height (cm)**	**Weight(kg)**	**BMI (kg/m^2)**
Mean±S.D.	27.7±8.21	166.62±8.05	85.6±10.29	30.77±1.73

The above table shows the mean of the age, height, weight, and BMI respectively for the patients with Fatty Liver. The average age is 27.7±8.21, height is 166.62±8.05 in cm, weight is 85.6±10.29 in kgs, and BMI is 30.77±1.73 (kg/m^2).

Table 2: Age wise distribution

Parameter	Measurements
Age	**27.7±8.21**

The mean age of the subjects in the intervention was 27.7 years (ranging between 22-50 years). The standard deviation of age is ±8.21 as shown in table no 2 respectively.

Gender wise distribution

As shown in fig.1, amongst the subjects who were suffering from fatty liver disease, 40% were female and only 60% were male.

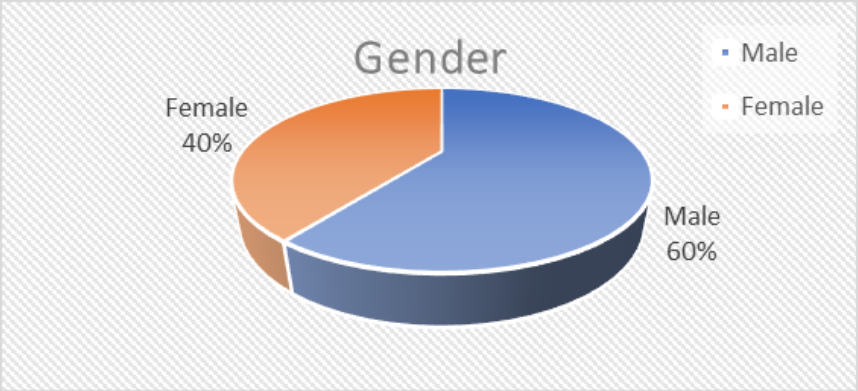

Fig. 1: Gender-wise distribution

Table 3: t-test before and after session for SGOT

Variable	SGOT (Mean ± SD)	t-test	Remarks
pre	35.4 ±18.44	t=2.4283 df = 9	Significant at the level of p Value 0.05
post	27.87 ±10.44		

A t-test was done where the average pre-value was 35.4 ±18.44 and the post-value was 27.87 ±10.44 for SGOT levels in the Liver function test. There was a significant reduction (p-value 0.05) in the SGOT post-treatment as shown in table no. 3 respectively.

Table 4: t-test before and after the session for SGPT

Variable	SGPT (Mean ± SD)	t-test	Remarks
Pre	41.45±21.86	t=2.7105 df=9	Significant at the level of p Value 0.05
Post	32.16±11.48		

A t-test was done where the average pre-value was 41.45±21.86 and post value was 32.16±11.48 for SGPT levels in the Liver function test. There was a significant reduction (p-value 0.05) in the SGPT post-treatment as shown in table no. 4 respectively.

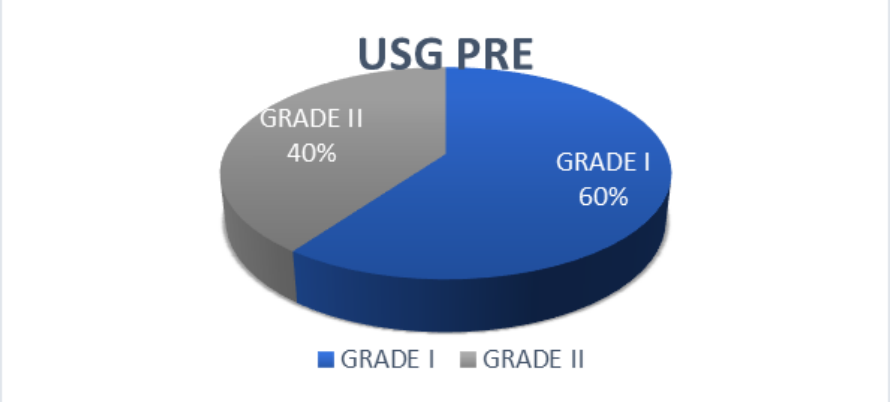

Fig. 2: Grading of fatty liver pre-treatment

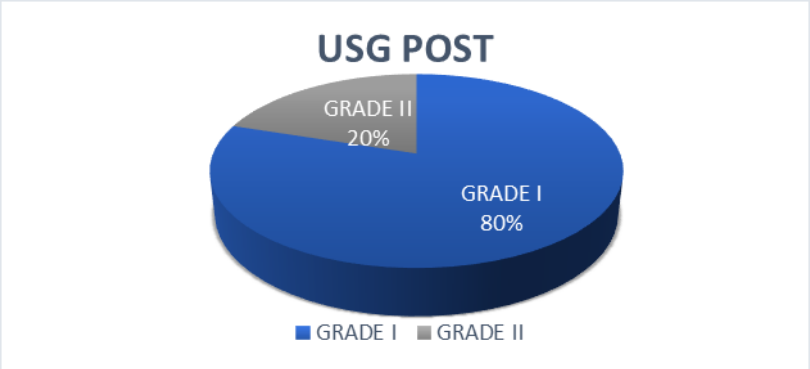

Fig. 3: Grading of fatty liver post-treatment

As shown in fig. 2, 40% of subjects had grade II fatty liver which was improved to 20% after the treatment shown in fig. 3. Subjects who had grade II fatty liver changes were able to reverse to grade I post-treatment as shown in fig. 3.

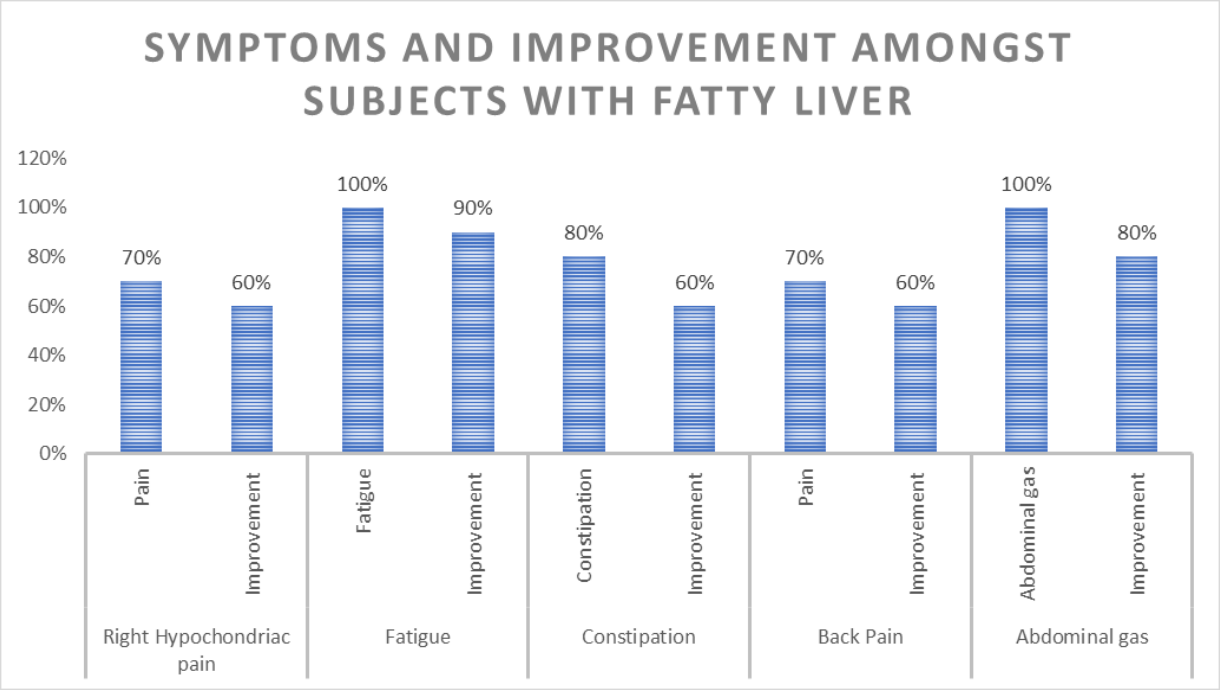

Fig. 4: Symptoms and Improvement amongst subjects with fatty liver

As shown in figure 4, 70% of subjects had right hypochondriac pain and 60% of subjects showed improvement in pain post-treatment, 100% of subjects had fatigue and post-treatment 90% showed improvement in fatigue, 80% of subjects had constipation and 60 % showed improvement post-treatment, 70% of subjects had back pain and 60% patients showed improvement post-treatment, 100% of had abdominal gas and 80% showed improvement post-treatment.

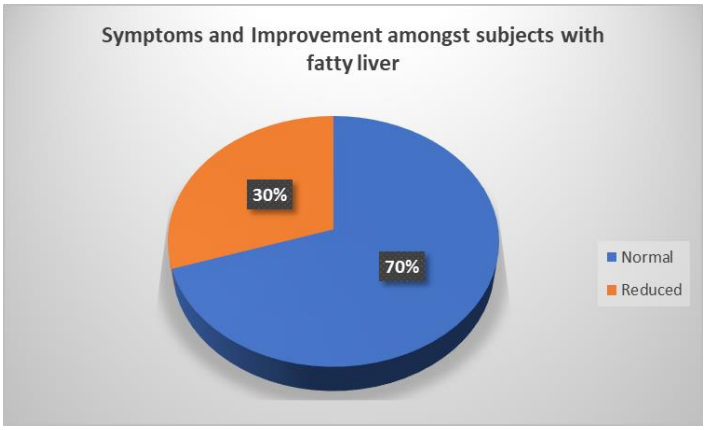

Fig. 5: Appetite in subjects with fatty liver

As shown in fig. 5, Among all the subjects, 70% of subjects with fatty liver had normal appetite and 30% of subjects with fatty liver had a loss of appetite before the treatment. It was observed that 30% of subjects with fatty liver who had reduced appetite showed improvement post-treatment.

DISCUSSION

Osteopathic manipulation of the internal organs is known to be as old as osteopathy. Still treating the viscera, we described manipulations aimed at influencing the organ primarily through the circulatory system and enhancing its self-healing power. The movement of internal organs is suspected of mobility, motility, and motricity (11,13).

The purpose of this study was to investigate the effects of osteopathic techniques on fatty liver. Fatty liver occurs when there are 5 or more fats in the liver. It is caused by unhealthy eating habits and the sedentary lifestyle of non-alcoholic people. Central obesity is one of the major causes of fatty liver, with high prevalence in young adults due to junk food consumption and alcoholism.

Previously, interventions prescribing diet and exercise regimens were used to ameliorate fatty liver, but no permanent cure was seen, leaving a wide field open to other treatments. A research study by Hallsworth, *et al.*, mentions, despite weight loss, there is an urgent need for non-weight loss therapies (15). Exercise is Healthy Wherever movement is restricted or diminished, the disease begins. All structures in the body have mobility, motility, and motor functions. All movements are linked to express health dynamically. There are a variety of techniques that work with the musculoskeletal system, such as mobilization, muscle energy techniques, trigger point release techniques, and more. Visceral manipulation is guided by an understanding of the anatomy and physiology of the organ being treated (11-13).

Mobility can be defined as movement between two organs or between adjacent organs or structures. For example, moving the liver with the stomach, or moving the liver to move the diaphragm during inhalation and exhalation (11).

Motility can be defined as the intrinsic movement of a structure, also called foetal movement. According to Dr Andrew Taylor Still, every structure in our body is bone. The fascia or organ has a unique name for the movement, primary respiratory movement (PRM), separate from the respiratory system or respiration. This inherent movement is slow in frequency and small in amplitude. It is a motor representation of movement in tissues and can be recognized by trained physicians. A rhythmic representation of this repetitive movement is the initial movement back to the origin. This is called an inspiration and expiration PRM of 7-8 cycles/min. Each cycle includes inspiration and expiration (11).

Motricity is the movement of structures or passive changes in the position of organs during locomotion. This also includes involuntary movements of organs controlled by the autonomic nervous system, such as peristalsis. Dynamic movements such as forward bending, back bending, and side-to-side rotation of the upper body cause movement of the thoracic and abdominal structures. Walking mainly causes passive movement of structures in the pelvis. This passive rearrangement during locomotion is motricity (11). Because structure and function are interrelated, these movements are subject to facial limitations and dysfunction of surrounding structures. All organs are lined with fascia, and internal dysfunction of an organ can first cause restriction of the fascia of that organ and then the restriction of the surrounding structures. It can reduce blood flow to that area and reduce organ function and effectiveness.

Visceral manipulation has a very drastic impact on improving organ function and thus improving an individual's quality of life. The liver as a metabolic organ plays an important role in the digestive system. Liver dysfunction can lead to symptoms such as fatigue, back pain, right upper quadrant pain, constipation, bloating, loss of appetite, and can even cause indigestion. Considering inclusion and exclusion criteria, this study included 10 subjects diagnosed with grade I and grade II fatty liver. The age group of the study ranged from He's 20 to He's 50 and included both males and females. The diagnosis was made using ultrasound and liver function tests (SGOT/SGPT). No diet was recommended for subjects during the treatment period. The intervention lasted three weeks with one session per week. Pre- and post-measures were statistically calculated.

Subjects had all symptoms that were present prior to treatment. After the procedure, the ultrasound showed no significant changes, but the symptoms were greatly reduced and the digestive system was functioning healthily. SGOT/SGPT scores returned to the normal range after 3 sessions. There was also a drastic improvement in symptoms after treatment. Liver manipulation helped reduce fascial restriction and inflammation, resulting in reduced right upper quadrant pain and lower back pain. The right hepatic flexure lies just below the liver, and liver dysfunction can directly affect the colon, leading to decreased peristalsis, abdominal constipation and bloating. Liver manipulation reduces inflammation and fascial restriction in the flexure of the liver, improves peristalsis of the colon, especially the transverse colon, and helps reduce constipation and bloating. improves liver function, flushes out toxins, and improves liver function.

Improved functionality leads to improved structure. Fatty liver often occurs when the liver becomes enlarged and can also become inflamed i.e. Hepatitis

of the liver, causing hardening of the liver. Pain and discomfort in the right upper quadrant are common. Manipulation of the liver loosens the fascia and also improves ligament relaxation. It also helps increase blood flow to the liver, reducing inflammation and pain, as the role of arteries is supreme, and healthy blood flow promotes healthy function. It also improves liver motility, mobility and exercise capacity.

CONCLUSION

The prevalence of fatty liver is increasing day by day due to unhealthy eating habits and sedentary lifestyles, and there is no permanent cure. Osteopathic techniques treat the symptoms of fatty liver patients and improve their quality of life. OMT has been shown to play an important and effective therapeutic role in improving the condition and may also reverse the initial stage i.e., grade I if the number of sessions is increased with adequate gapping between two sessions. Osteopathic techniques have the potential to play an important therapeutic role in the management of patients with fatty liver.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest to disclose in the study.

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