Review Article

Effectiveness of Progressive Muscle Relaxation Therapy (PMRT) on Sleep Quality among Chronic Liver Disease (CLD) Patients

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Abstract

Chronic liver disease (CLD) is a progressive deterioration of liver functions for more than six months, which includes synthesis of clotting factors, other proteins, detoxification of harmful products of metabolism and excretion of bile. The chronic liver disease represents a continuous and progressive process of hepatic fibrosis, liver tissue architectural distortion, and regeneration nodule formation. While fibrosis is usually irreversible, but it can be reversible in the initial stage of development. The transition time point of reversible fibrosis to irreversible fibrosis is still not completely understood.[1] Sleep disturbances, particularly daytime sleepiness and insomnia, are common problems reported by patients suffering from liver cirrhosis. Poor sleep negatively impacts patients' quality of life and cognitive functions and increases mortality. Although sleep disturbances can be an early sign of hepatic encephalopathy (HE), many patients without HE still complain of poor quality sleep.[2] Progressive muscle relaxation is based upon the simple practice of tensing, or tightening, one muscle group at a time followed by a relaxation phase with release of the tension and improves sleep quality among patients with CLD.

Keywords: *CLD, PMRT, Sleep Quality, Effectiveness.*

Introduction

The Asia-Pacific region is home to more than half of the global population and accounted for 62·6% of global deaths due to liver diseases in 2015. 54·3% of global deaths due to cirrhosis, 72·7% of global deaths due to hepatocellular carcinoma, and more than two-thirds of the global burden of acute viral hepatitis occurred in this region in 2015.

According to the third round of WHO's 2015 Global Health Estimates (GHE), liver diseases caused 312480 (4· 6%) of 28444814 deaths in the Asia-Pacific region in 2015, compared with 72437 (2.7%) of 2649742 in the USA and 197179 (2.1%) of 9278557 in Europe. The Asia-Pacific region accounts for 62.6% of 2095207 deaths due to liver diseases globally for that year. In Asian countries, the median proportion of deaths attributable to liver disease was 3.9% (range 1.86–13.9). By contrast, liver diseases caused 2.05% of all deaths in Australia and 1.33% of those in New Zealand in 2015, with underlying etiologies varying between countries.

In India, alcohol consumption is also a common cause of liver disease-related mortality. Alcohol consumption accounted for 22·2% of all deaths due to cirrhosis and other chronic liver diseases and for 19·9% of all deaths due to liver cancer in India, as reported by the GHE 2015 dataset (table 2). According to 2016 WHO estimates, age standardized deaths from cirrhosis in adult Indian men and women were 45·8 per 100 000 individuals per year and 14·7 per 100 000 individuals per

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year, respectively, with 60·0% (in men) and 33·3% (in women) of these attributed to alcohol consumption.165 This prevalence might be underestimated because of poor reporting, low social acceptance of drinking, and no insurance cover for alcohol related diseases. Of all deaths due to alcohol-related cirrhosis worldwide in 2015, 19·8% were estimated to occur in India; this is a high proportion, given that the Indian population comprises 17·8% of the global population, has a smaller proportion (72·3%) of people aged at least 15 years than the global average, and has a very high proportion of lifetime alcohol abstainers (53·5% of individuals aged ≥15 years in 2016) compared with other 165 countries. WHO estimates indicate that the numbers of deaths due to alcohol-related cirrhosis in India increased by 22·7% (from 47 000 to 57 700) between 2000 and 2015.[3]

Material and Methods

Internet data bases used were PubMed and Google Scholar. The key words used were CLD, PMRT, Sleep Quality. The major six articles were cited although there were dearth of literature.

CLD and Sleep Disorder

Patients with liver disease report significantly more sleep disturbances than healthy individuals. Common complaints in regard to sleep are prolonged time to fall asleep (longer sleep latency), shortened sleep duration, daytime sleepiness (somnolence), poor sleep quality, and frequent nocturnal awakenings. Case control studies report that insomnia and daytime sleepiness are the most commonly reported problems. Insomnia in patients with hepatic cirrhosis varies from 26% to 42% while less than 10% of the control groups of healthy individuals typically experience insomnia. Recent studies have even shown quantitative evidence of sleep disturbances in cirrhosis patients, which when compared to controls have reduced REM sleep on polysomnography.[4]

Sleep disturbance and excessive daytime sleepiness have been reported in patients with hepatic cirrhosis. The objective of this study was to evaluate daytime somnolence and sleep complaints in a group of 178 patients with cirrhosis compared to a control group. Sleep features and excessive daytime sleepiness were evaluated by the Basic Nordic Sleep Questionnaire (BNSQ) and the Epworth Sleepiness Scale (ESS);collected clinical and laboratory data, neurological assessment and EEG recordings in cirrhotic patients. Patients with cirrhosis complained of more daytime sleepiness ($p<0.005$), sleeping badly at least three times a week ($p<0.005$), difficulties falling asleep ($p<0.01$) and frequent nocturnal awakening ($p<0.005$) than controls. We found a poor correlation between sleep disorders and clinical or laboratory parameters. Our results confirm previous literature reports suggesting a high prevalence of sleep disturbance in patients with cirrhosis. Insomnia and daytime sleepiness are the main complaints. Sleep disorders are probably a multifactorial phenomenon and challenging condition that significantly adds to the burden of suffering experienced.[4]

A considerable proportion of patients with cirrhosis exhibit insomnia, delayed sleep habits, and excessive daytime sleepiness. These have been variously attributed to hepatic encephalopathy and impaired hepatic melatonin metabolism, but the understanding of their pathophysiology remains limited and their treatment problematic. Sleep is regulated by the interaction of a homeostatic and a circadian process. The homeostatic process determines sleep propensity in relation to sleep-wake history, thus the need to sleep increases with the duration of the waking period. The circadian process, which is marked by the 24-hour rhythm of the hormone melatonin, is responsible for the alter-nation of high/low sleep propensity in relation to dark/light cues. Circadian sleep regulation has been studied in some depth in patients with cirrhosis, who show delays in the 24-hour melatonin rhythm, most likely in relation to reduced sensitivity to light cues. However, while melatonin abnormalities are associated with delayed sleep habits, they do not seem to offer a comprehensive explanation to the insomnia exhibited by these patients. Fewer data are available on homeostatic sleep control: it has been recently hypothesized that patients with cirrhosis and hepatic encephalopathy might be unable, due to excessive daytime sleepiness, to accumulate the need/ ability to produce restorative sleep.[4]

Progressive Muscle Relaxation therapy

Progressive Muscle Relaxation therapy (PMRT) is a mind-body technique that involves slowly tensing and then relaxing each muscle group in the body. Typically

used to reduce stress, PMRT is said to increase your awareness of the sensations associated with tension. Relaxation can be highly beneficial if practiced routinely in one's everyday life. Techniques involving relaxation are widely used by people to reduce anxiety and cope with stress-related problems. Relaxation therapy is initiated and taught to peoples but is practiced primarily in the clients own environment. There are countless methods used to achieve relaxation, but the procedures that are most commonly practiced in the clinical setting are Jacobson's (1938) PMRT.As PMRT is found effective, safe, non pharmacological, non- invasive, cost effective method in conditions like anxiety, depression, stress and pain.[5]

The principle of PMR is based on relaxation of the affected region after strong tensing of the muscles. Repeated use leads to a 'cultivation of muscle sense'; the patient consciously learns to be sensitive to the body and perceive the tiniest tension in order to know where to relax.

Theoretical basis

The physiologist Edmund Jacobsen worked on the assumption that a condition of rest or relaxation can most reliably be established by a reduction in neuromuscular tension and that inversely activity in the CNS can be reduced through a reduction in muscle tension (the premise of reciprocity). He began to gather empirical evidence of this interplay between the central nervous, mental processes and peripheral muscle changes in a series of studies in 1920. Jacobsen investigated the startle reaction after a sudden loud noise and ascertained that people who have learned to relax their muscles are not startled.[6]

The level of muscle tension also affects the extent of the reflex. Jacobsen also ascertained that mental visualization, especially if associated with exercise, led to slight but measurable muscular activity. For example, he showed that imagining specific arm movements was associated with an increase in EMG activity of the biceps muscles.

Appropriate eye movements could also be recorded by visualizing images (e.g. following the zigzag movements of a rabbit). Empirical evidence for the effect of the power of the imagination on the muscles or on various body functions was provided in a series of later investigations.

Effectiveness of PMRT on sleep quality

Freeman (2001) suggests that PMR and other muscle-based relaxation variations convey health benefits in three ways:

1. Utilizing the effects of PMR to manipulate autonomic responses: Autonomic responses determine whether the body needs to engage in a 'fight-or-flight' or 'rest-and-digest' scenario or to a state somewhere between these two extremes. The sympathetic division of the autonomic nervous system (ANS), associated with 'flight-or-fight' responses, mobilizes the body in emergency and stressful circumstances. Many of these responses are not immediately apparent to our consciousness. Physically, blood flow is redirected away from the digestive process to the smooth muscle, heart rate and blood pressure increase, with these processes triggered by the increase of circulating catecholamines, which include adrenaline and noradrenaline (Hucklebridge&Clow 2002). Associated with the stress response is the release of cortisol, which mobilizes energy reserves, increases sensitivity of tissues to neurotransmitters and inhibits the immune and inflammatory response.[6]

2. Increases or activates the production of opiates: Important to well-being, endogenousopioids, suchas enkephalins, dynorphins, endomorphins and β-endorphin, have been found to have a variety of effects, including analgesic, anti inflammatory and bronchodilation (Jessop 2002). These compounds and their receptor sites have been located within immune tissues (Stephanou et al 1990). It has been argued that opioids play an important part in modulating stress responses. It has been noted that opioid production is increased in adults who exercise regularly (Freeman 2001) and is reduced in adults with enduring health problems such as chronic fatigue syndrome (Conti et al 1998). In a laboratory experiment (n = 32) to determine the role of endogenous opioids in the effects of PMR training, McCubben et al (1996) found that PMR significantly reduced diastolic pressure, but when an opioid blockade was administered, it antagonized the

PMR training. Hypnotherapists could utilize the potential responses of reduced anxiety and pain relief in the development of anchors and post-hypnotic suggestions, with an intention to help build a patient's resources

3. Promotes optimal immune function: Over three decades, Herbert Benson and colleagues (1984) have investigated the psychological and physiological effects associated with the relaxation response, elicited from PMR, meditation, yoga and physical exercise routines, many of which appear to be the opposite of the stress response. Stefano et al (1996:) have acknowledged that repetition is crucial to the relaxation response, but surmise that 'trust or belief in expected outcomes' can help to regulate immunological function via cognitive and neurological processes. This sense of improved well-being associated with the relaxation response has been labelled 'remembered wellness', which Benson (1996) has ascribed to memories of nurturance and maternal attachment. Lazar et al (2000) have investigated the relaxation response to meditation with functional magnetic resonance imaging (MRI) and mapped areas of the brain, which are responsive to opioids. Stefano et al (1996) suggests that this work demonstrates the mind–body wiring that could modulate the relationship between cognitive and physiological processes. In this review of neural processes and the relaxation response, Stefano and colleagues (1996) note that increased circulatory levels of opioids improve mood and sense of well-being, and refer to earlier work on enkephalins, which they found to have the additional benefit of stimulating immune cells. Aside from effects of opioids on heart rate, blood pressure, respiration, immune cells and mood, these compounds have also been found to stimulate antibacterial peptides in human studies. This information can provide a wealth of ideas for hypnotherapists using PMR and tailored suggestions, to enable patients to connect with feelings of being nurtured and supported.

Conclusion

Sleep disturbance is the most common reported problem among CLD patients. From a thorough literature review it was found that PMRT is very effective in improving the Sleep quality and it has a great scope in complimentary therapies in Clinical practice.

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