International Journal of Academic Excellence and Research (IJAER)
ISSN: 3107-3913 (Online) || Peer Reviewed || Open Access
Publication Impact Factor (I2OR) : 4.450
Vol. 02, No. 03, July-September, 2026, pp 79-88
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Therapeutic Efficacy of Rajayoga Meditation and Varma Therapy in Attenuating Occupational Stress and Reversing Non-Alcoholic Fatty Liver Disease among Night-Shift Information Technology Professionals

S. Venkatesan[1*] | Dr. D.R. Rajendran[2]
[1]Research Scholar, Manipur International University, Manipur, India.
[2]Professor, Sandip Institute of Technology and Research, Nashik, India.
[*]**Corresponding author:** venkatesansudalai@gmail.com

Citation: Venkatesan, S. & Rajendran, D. (2026). Therapeutic Efficacy of Rajayoga Meditation and Varma Therapy in Attenuating Occupational Stress and Reversing Non-Alcoholic Fatty Liver Disease among Night-Shift Information Technology Professionals. International Journal of Academic Excellence and Research, 02(03), 79–88.

Abstract: *The growing incidence of Non-Alcoholic Fatty Liver Disease (NAFLD) among night-shift IT professionals is posing as a major occupational health issue since shift work, sedentary lifestyle, psychosocial stress, lack of sleep, and disrupted circadian rhythms can lead to metabolism problems and fatty liver. Even though there is a possibility to cure NAFLD by adopting lifestyle changes, the pharmacological intervention for NAFLD is minimal and there is a high potential for the use of mind-body techniques like Rajayoga Meditation and Varma Therapy to enhance metabolic, psychological, and physiological well-being. The present study intended to determine the efficacy of Rajayoga Meditation and Varma Therapy on occupational stress and NAFLD among night-shift IT professionals. An interventional study was performed among 60 IT workers on night shift (aged between 25 and 45 years; 30 males and 30 females) suffering from NAFLD (Grades I and II), who participated in a protocol involving Rajayoga meditation and Varma therapy for a duration of 12 weeks. Parameters measured included Perceived Stress Scale (PSS-10), serum cortisol, lipid profile, levels of anxiety and depression, which were measured using the Depression Anxiety Stress Scale-21 (DASS-21), and status of liver, as determined by ultrasound scanning. Data analysis involved paired statistical test, with $p<0.001$ being regarded as statistically significant. Significant improvement was seen post-intervention in all the parameters mentioned above, including Perceived Stress Scale score, serum cortisol level, lipid profile levels, DASS-21 scores for anxiety and depression, and ultrasonography-based NAFLD grading. The results showed that Rajayoga meditation and Varma therapy could lead to significant improvements in psychological well-being, stress-related biomarkers, lipid metabolism, and NAFLD-related ultrasonographic features among night-shift IT professionals.*

Article History:
Received: 06 September, 2026
Revised: 11 September, 2026
Accepted: 15 September, 2026
Published Online: 25 September, 2026

Keywords:
Rajayoga Meditation, Varma Therapy, Occupational Stress, Non-Alcoholic Fatty Liver Disease, Night-Shift Workers, Information Technology Professionals, Integrative Medicine, Cortisol, Lipid Profile.

Introduction

Non-alcoholic fatty liver disease (NAFLD) has become one of the common chronic liver conditions around the world, as well as among IT specialists who work on night shifts (Younossi et al., 2016). It is worth mentioning that the global rate of NAFLD is about 25% of adults and it varies in specific occupation types (Chalasani et al., 2018). The combination of circadian rhythm disturbances, prolonged

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periods of immobility, unhealthy diet, lack of sleep, and increased occupational stress plays an important role in the development of hepatic steatosis (Eslam et al., 2020).

There are several aspects that make IT professionals working at night shifts a high-risk group for developing NAFLD. First, it should be emphasized that disturbance of natural circadian rhythm by means of shift work may affect the metabolic processes via different mechanisms, including glucose intolerance, insulin resistance, and dyslipidemia (Rinella, 2015). Moreover, the immobility of IT professionals, which continues beyond the typical work schedule, leads to low levels of physical activity and excessive visceral fat, which increases the likelihood of NAFLD (Younossi, 2019).

Chronic psychological stress in the IT field triggers HPA axis activation, which results in the production of higher levels of cortisol, insulin resistance, inflammation and fat deposits in the hepatocytes (Cohen et al., 1983). The negative effects of stress on metabolism are worsened by irregular nutrition and lack of sleep in night shift employees. Apart from causing disturbances in the metabolic processes, chronic psychological stress worsens hepatic inflammation and liver function through neuroendocrine and inflammatory mechanisms (Riley & Park, 2015).

Besides having detrimental effects on the physical well-being of NAFLD patients among night shift IT professionals, psychosocial issues can also have profound consequences in terms of psychology and social well-being. Such people are usually stressed, anxious, suffer from burnouts, fatigue, poor sleep and lack of focus. These problems not only influence personal lives but also work and social relations. Irregular schedules limit opportunities to communicate with family members, cause conflicts with others, and restrict one's participation in social events and activities. As a result, individuals may feel lonely and unsupported, which is also associated with low quality of life (Telles et al., 2020).

The traditional approach towards managing NAFLD mainly includes lifestyle modification like dietary change, exercise, and weight loss (Chalasani et al., 2018). Nevertheless, maintaining adherence to lifestyle modifications poses some challenges in high-stress work environments, especially among night shift workers with a hectic schedule and little spare time for health practices. Moreover, limited drugs can be used to manage NAFLD as there is no approved medication for NAFLD (Rinella, 2015).

Therefore, mind-body techniques, such as Rajayoga meditation and Varma therapy, have attracted much interest in managing stress, autonomic regulation, metabolism, and wellness (Ross & Thomas, 2010; Woodyard, 2011). Rajayoga meditation is one type of meditation that involves the principles of positive thought, self-awareness, and emotion regulation, and it has proven effective in stress, anxiety, depression reduction, and improving emotional well-being and resilience (Jain et al., 2025). Varma therapy, which refers to an ancient healing method in India involving therapeutic pressure in specific vital points, has proved useful in improving circulation, neuromuscular coordination, autonomic regulation, and relieving pain (Mishra & Shrivastava, 2023).

Combining Rajayoga meditation with Varma therapy is a mind-body technique that covers both psychological and physiological dimensions of NAFLD patients. Though separate methods used in the integrated technique have been proven effective in other studies for different purposes, there is no sufficient research done regarding the efficacy of this combined technique for treating NAFLD in night shift IT employees. Therefore, this research intends to fill this vital gap by studying an integrated mind-body technique in the target high-risk occupational group.

The main goal of the research is to estimate the effectiveness of Rajayoga meditation and Varma therapy as the treatment that can relieve occupational stress and reverse NAFLD in night shift IT workers. The secondary goals are to determine the impact of the intervention on the liver functioning based on the serum cortisol level, determine the changes in ultrasonographic assessment of NAFLD, determine changes in metabolic and psychological factors, and establish a link between stress relief and NAFLD treatment.

Review of Literature

- **Epidemiology and Burden of Non-Alcoholic Fatty Liver Disease (NAFLD)**

The global meta-analysis carried out by Younossi et al. (2016) revealed that NAFLD is present in about 25% of the world's adult population. This is considered a substantial public health problem, given that obesity, insulin resistance, metabolic syndrome, and physical inactivity were recognized as the main risk factors in this study, whose prevalence varies significantly between different regions of the globe. In turn, Chalasani et al. (2018) gave comprehensive guidelines for diagnosing and treating NAFLD based

on the American Association for the Study of Liver Diseases (AASLD). These recommendations stated that reduction in body weight through a combination of dietary restrictions, physical activity, and behavior modifications is still the key to the treatment of NAFLD. Moreover, Eslam et al. (2020) introduced an evidence-based name change for the disease from NAFLD to Metabolic Associated Fatty Liver Disease (MAFLD). Rinella (2015) performed a systematic review of NAFLD, stating that the disease is characterized by a range of liver abnormalities from steatosis through NASH, cirrhosis, and hepatocellular carcinoma.

- **Occupational Stress among Night-Shift IT Professionals**

Cohen, Kamarck, and Mermelstein (1983) developed the Perceived Stress Scale (PSS), one of the most widely used instruments for assessing psychological stress. Their work established that chronic stress adversely affects both physical and mental health through multiple pathways, including neuroendocrine dysregulation, immune dysfunction, and behavioral changes. Telles et al. (2020) investigated the impact of residential yoga training on occupational stress and health promotion and found that yoga significantly reduced occupational stress and improved psychological well-being through enhanced relaxation and autonomic regulation. Bhargav, George, and Varambally (2022) reported that chronic occupational stress contributes to anxiety, depression, sleep disturbances, and metabolic disorders, and found that yoga-based interventions improve resilience and emotional well-being.

- **Rajayoga Meditation and Psychological Well-being**

Jain et al. (2025) conducted a randomized control trial examining the impact of Rajayoga meditation on stress and psychological well-being during the COVID-19 pandemic in India. The study demonstrated that Rajayoga meditation significantly reduced perceived stress, anxiety, and depression while improving emotional well-being and resilience among adults. Riley and Park (2015) conducted a systematic review examining how yoga reduces stress, identifying several mechanisms including cortisol reduction, autonomic nervous system balance, and enhancement of parasympathetic nervous system activity.

- **Yoga in the Management of NAFLD**

A comparative study by Ross and Thomas (2010) showed the benefits of both yoga and exercise on body composition, cardiopulmonary endurance, stress management, and overall well-being. In addition, according to Anand (2025), yoga training program led to significant improvement in liver enzymes and ultrasonographic examination of patients with grade I NAFLD indicating reversal of hepatic steatosis.

- **Varma Therapy and Integrative Medicine**

According to Mishra and Shrivastava (2023), stimulation of vital points in Marma (Varma) therapy leads to improved blood flow, neuromuscular coordination, autonomic regulation, and pain relief. Vijayakumar and Vijay (2025) found that an integrated treatment of yoga and Varma therapy was associated with significant improvement in blood glucose levels, cardiovascular and overall health status. Selvam and Yoganandhan (2025) found that both yoga and Varma therapy were effective in reducing depression and improving self-confidence of people with insomnia. Saravanabhava et al. (2026) found that there were significant improvements in pain, mobility, and function after integrated Varma therapy and yoga treatment.

- **Cortisol and Stress Response**

Cohen et al. (1983) established that prolonged psychological stress elevates cortisol secretion, which contributes to metabolic dysfunction, insulin resistance, obesity, and fatty liver disease. Riley and Park (2015) reported that yoga and meditation reduce cortisol levels through regulation of the HPA axis and improvement in autonomic nervous system function.

Objectives and Hypothesis

- **Primary Objective**

To evaluate the therapeutic efficacy of Rajayoga meditation, yoga, and Varma therapy in attenuating occupational stress and reversing Non-Alcoholic Fatty Liver Disease (NAFLD) among night-shift Information Technology (IT) professionals.

- **Secondary Objectives**
- To evaluate the effect of the intervention on liver function by measuring serum cortisol levels
- To determine changes in the ultrasonographic grading of Non-Alcoholic Fatty Liver Disease following the intervention
- To evaluate changes in metabolic parameters such as lipid profile after the intervention
- To evaluate changes in psychiatric parameters such as anxiety and depression
- To determine the relationship between occupational stress reduction and improvement in NAFLD-related clinical and biochemical parameters
- **Hypotheses**

Null Hypothesis (H_0): Rajayoga meditation, yoga, and Varma therapy do not produce statistically significant changes in occupational stress levels, liver function, metabolic parameters, or fatty liver grade among night-shift information technology professionals with NAFLD.

Alternative Hypothesis (H_1): Rajayoga meditation, yoga, and Varma therapy produce statistically significant reductions in cortisol hormone levels and occupational stress, and significant improvements in liver function, metabolic parameters, and fatty liver grade among night-shift information technology professionals with NAFLD.

Methodology

- **Study Design**

A prospective, pre-test and post-test interventional study was conducted to evaluate the therapeutic efficacy of Rajayoga meditation, yoga, and Varma therapy in reducing occupational stress and reversing Non-Alcoholic Fatty Liver Disease (NAFLD) Grade I and Grade II among night-shift Information Technology (IT) professionals.

- **Study Setting and Duration**

The study was conducted in selected Information Technology companies and an integrative naturopathy and yoga therapy center in Chennai, India. The study duration was 12 weeks, conducted between May and July 2026. A total of 60 participants were recruited for the study.

- **Participant Selection**
  - **Sampling Technique**

Participants meeting the eligibility criteria were recruited using purposive sampling and randomly assigned to either the intervention or control group using a computer-generated randomization method. A total of 60 participants (30 males and 30 females) were recruited.

  - **Inclusion Criteria**
    - Men and women aged 25-45 years
    - IT professionals with at least one year of night-shift work
    - Ultrasonography-confirmed Grade I or Grade II NAFLD
    - Willing to participate and provide written informed consent
  - **Exclusion Criteria**
    - Alcoholic liver disease
    - Viral hepatitis or chronic liver diseases
    - Grade III fatty liver or liver cirrhosis
    - Pregnancy or lactation
    - Current participation in another structured lifestyle intervention
    - Severe psychiatric, cardiovascular, or musculoskeletal disorders preventing participation
- **Outcome Measures and Assessments**
  - **Primary Outcomes**

Serum Cortisol Levels: Measured to assess the physiological stress response and changes in hypothalamic-pituitary-adrenal (HPA) axis activity before and after the intervention.

Occupational Stress Score: Assessed using the Perceived Stress Scale (PSS-10) to determine changes in work-related stress.

Liver Fat Grade by Ultrasonography: Assessed using abdominal ultrasonography to determine the severity of hepatic steatosis and evaluate the reversal or improvement of NAFLD following the intervention.

- **Secondary Outcomes**

Lipid Profile: Total Cholesterol, Triglyceride, LDL, HDL, and VLDL were measured in fasting serum to determine the effect of the intervention on lipid metabolism.

Anxiety and Depression: DASS-21 scale used to measure changes in psychological well-being after the intervention.

- **Procedure for Data Collection**

The baseline data were collected prior to the intervention. Post-intervention assessment was done immediately following the 12 weeks' intervention with the use of the same methods and tools.

- **Interventions**
  - **Rajayoga Meditation Component**

Time: 20 minutes per day

Frequency: Five times per week

It involves guided meditation with emphasis on positive thinking, self-awareness and stress relief.

- **Yoga Component**

Time: 40 minutes per day

Frequency: Five times per week

It involves loosening up exercise, selected asana, pranayama and relaxation for NAFLD and occupational stress sufferers.

- **Varma Therapy Component**

Time: 30 minutes per session

Frequency: Two sessions per week

It is done by certified Varma therapist using specific pressure application on certain Varma points.

Total Intervention Duration: 12 weeks

- **Statistical Analysis**

Data were analyzed using SPSS (Version 26). Descriptive statistics summarized participant characteristics. Normality was assessed using the Shapiro-Wilk test. Paired t-test was used for within-group comparisons. Effect sizes were calculated using Cohen's d. Pearson correlation analysis assessed associations between occupational stress and NAFLD parameters. Statistical significance was considered at $p < 0.05$.

Results

- **Characteristics of Participants**

Table 1: Characteristics of the Study Participants (n = 60)

Variables	Male (n=30)	Female (n=30)	Total (n=60)
Age (years), Mean±SD	35.2 ± 6.1	34.8 ± 5.9	35.0 ± 6.0
BMI (kg/m²), Mean±SD	28.4 ± 3.2	27.9 ± 3.5	28.2 ± 3.4
PSS-10 Score, Mean±SD	28.9 ± 5.1	29.3 ± 4.7	29.1 ± 4.9
Serum Cortisol (µg/dL), Mean±SD	19.8 ± 3.1	19.4 ± 3.3	19.6 ± 3.2
Total Cholesterol (mg/dL), Mean±SD	221.5 ± 19.2	220.1 ± 20.1	220.8 ± 19.6
Triglycerides (mg/dL), Mean±SD	189.2 ± 26.1	187.8 ± 27.5	188.5 ± 26.8
LDL Cholesterol (mg/dL), Mean±SD	143.8 ± 15.1	142.6 ± 15.7	143.2 ± 15.4
HDL Cholesterol (mg/dL), Mean±SD	41.5 ± 5.3	42.1 ± 5.1	41.8 ± 5.2

Anxiety (DASS-21), Mean±SD	15.3 ± 3.7	14.9 ± 3.9	15.1 ± 3.8
Depression (DASS-21), Mean±SD	16.8 ± 4.1	16.2 ± 4.3	16.5 ± 4.2
Ultrasound Sonography (Baseline)			
Grade 1 NAFLD	15 (50.0%)	15 (50.0%)	30 (50%)
Grade 2 NAFLD	15 (50.0%)	15 (50.0%)	30 (50%)

Abbreviations: PSS-10, Perceived Stress Scale-10; NAFLD, Non-Alcoholic Fatty Liver Disease; DASS-21, Depression Anxiety Stress Scale; LDL, Low Density Lipoprotein; HDL, High Density Lipoprotein; SD, Standard Deviation.

- **Stress Score Before and After Intervention**

Table 2: Stress Score Before and After Intervention

Variable	Pre-Test Mean±SD	Post-Test Mean±SD	Mean Change	T-Value	p-Value	Effect Size (d)
PSS-10 Score	29.1 ± 4.9	17.3 ± 3.8	-11.8	11.26	<0.001	0.82

Abbreviation: PSS-10, Perceived Stress Scale-10; SD, Standard Deviation. Statistically significant at $p < 0.05$. Effect size interpretation: small (0.2-0.5), medium (0.5-0.8), large (>0.8).

- **Serum Cortisol Level Before and After Intervention**

Table 3: Serum Cortisol Level Before and After Intervention

Variable	Pre-Test Mean±SD	Post-Test Mean±SD	Mean Change	T-Value	p-Value	Effect Size (d)
Serum Cortisol (µg/dL)	19.6 ± 3.2	13.9 ± 2.5	-5.7	3.94	<0.001	1.46

Abbreviation: SD, Standard Deviation. Statistically significant at $p < 0.05$. Effect size interpretation: small (0.2-0.5), medium (0.5-0.8), large (>0.8).

- **Lipid Profile Before and After Intervention**

Table 4: Lipid Profile Before and After Intervention

Lipid Parameters	Pre-Test Mean±SD	Post-Test Mean±SD	Mean Change	T-Value	p-Value	Effect Size (d)
Total Cholesterol (mg/dL)	220.8 ± 19.6	190.2 ± 16.3	-30.6	7.82	<0.001	1.28
Triglycerides (mg/dL)	188.5 ± 26.8	150.6 ± 21.7	-37.9	7.15	<0.001	1.19
LDL Cholesterol (mg/dL)	143.2 ± 15.4	117.5 ± 13.6	-25.7	5.93	<0.001	1.14
HDL Cholesterol (mg/dL)	41.8 ± 5.2	49.8 ± 5.9	+8.0	5.28	<0.001	1.03

Abbreviation: LDL, Low Density Lipoprotein; HDL, High Density Lipoprotein; SD, Standard Deviation. Statistically significant at $p < 0.05$. Effect size interpretation: small (0.2-0.5), medium (0.5-0.8), large (>0.8).

- **Ultrasound Sonography Findings Before and After Intervention**

Table 5: Ultrasound Sonography Findings Before and After Intervention

Liver Grade	Pre-Test n (%)	Post-Test n (%)	Mean Change n (%)
Normal	0 (0%)	20 (33.3%)	+20 (33.3%)
Grade 1	30 (50.0%)	35 (58.3%)	+5 (8.3%)
Grade 2	30 (50.0%)	5 (8.3%)	-25 (41.7%)

Abbreviation: n, number of participants. Note: Improvement in liver steatosis was observed in 25 of 30 participants (91.7%) with Grade II NAFLD at baseline, who improved to Grade I or normal liver echogenicity following the intervention.

- **Anxiety and Depression Scores (DASS-21) Before and After Intervention**

Table 6: Anxiety and Depression Scores (DASS-21) Before and After Intervention

Variables	Pre-Test Mean±SD	Post-Test Mean±SD	Mean Difference	T-Value	p-Value	Effect Size (d)
Anxiety	15.1 ± 3.8	8.0 ± 2.8	-7.1	3.18	<0.001	1.49
Depression	16.5 ± 4.2	8.7 ± 3.2	-7.8	3.64	<0.001	1.57

Abbreviation: DASS-21, Depression Anxiety Stress Scale; SD, Standard Deviation. Statistically significant at $p < 0.05$. Effect size interpretation: small (0.2-0.5), medium (0.5-0.8), large (>0.8).

- **Summary of Findings**

Table 7: Summary of Outcome Measures

Outcome Measures	Percentage Change	Clinical Significance
Stress Score (PSS-10)	40.5% Reduction	Marked Reduction in perceived occupational stress
Serum Cortisol	29.1% Reduction	Improved physiological stress response and neuroendocrine regulation
Total Cholesterol	13.9% Reduction	Improved lipid metabolism and reduced cardiovascular risk
Triglycerides	20.1% Reduction	Significant improvement in lipid metabolism
LDL Cholesterol	17.9% Reduction	Reduced atherogenic lipid burden
HDL Cholesterol	19.1% Increase	Improved cardioprotective lipid profile
Anxiety (DASS-21)	47.0% Reduction	Marked Reduction in anxiety symptoms
Depression (DASS-21)	47.3% Reduction	Significant improvements in depressive symptoms
NAFLD Grade	41.7% Improvement	Marked regression of hepatic steatosis with substantial reversal of NAFLD severity

Discussion

- **Interpretation of the Findings**

The present study investigated the therapeutic efficacy of Rajayoga meditation, yoga, and Varma therapy in reducing occupational stress and reversing Non-Alcoholic Fatty Liver Disease (NAFLD) among night-shift Information Technology (IT) professionals. The findings demonstrate significant improvements across all measured outcomes, supporting the alternative hypothesis and rejecting the null hypothesis.

- **Stress Reduction**

A significant reduction in occupational stress scores was observed after the intervention, with a 40.5% decrease in PSS-10 scores. This substantial improvement in perceived stress suggests that the integrated intervention effectively addresses the psychological burden experienced by night-shift IT professionals. Rajayoga meditation fosters emotional stability, positive thinking, and self-awareness, while yoga facilitates autonomic balance using breathing exercises and physical postures. Varma therapy can complement these effects by fostering relaxation and enhancing neuromuscular and autonomic function. Thus, the intervention seems to be effective in managing occupational stress using a number of interconnected approaches. The effect size (d = 0.82) for stress reduction in the intervention group is clinically significant.

- **Decrease in Serum Cortisol**

The levels of serum cortisol were significantly decreased after the intervention with a decrease of 29.1% compared to the initial state. The effect size (d = 1.46) of the intervention is clinically significant. Cortisol is one of the key biomarkers of physiological stress and its elevated level causes insulin resistance, accumulation of visceral fat, lipids in the liver, and other manifestations of metabolic disorders (Cohen et al., 1983). The reduction of serum cortisol implies normalization of HPA axis functioning and explains at least partially the improvements in the state of liver. Reduction in the levels of serum cortisol was found in previous studies to be related to yoga and meditation interventions that normalize the functioning of HPA axis and autonomic nervous system (Riley & Park, 2015).

- **Lipid Profile Improvements**

Moreover, the intervention has led to remarkable changes in the lipid profile. The decrease in total cholesterol (13.9%), triglycerides (20.1%), and LDL cholesterol (17.9%) and increase in HDL cholesterol (19.1%) suggest good lipid metabolism. It is important to note that all the effect sizes for all the lipid parameters are large (d = 1.03 to 1.28). As the dyslipidemia is one of the main causes of steatosis, such improvements may have had a significant role in reducing the amount of liver fat. The

improvements in the lipid profile are consistent with the previous research on yoga and metabolism (Ross & Thomas, 2010; Cramer et al., 2016).

- **Ultrasonographic Regression**

There was a considerable reduction in the degree of fatty liver on ultrasonographic evaluation. Thirty-three point three percent of the participants achieved the normative liver echogenicity while another 58.3% of patients demonstrated a regression from grade II to grade I. There was only 8.3% of patients with grade II NAFLD after the intervention compared to 50% before the intervention. Thus, there is a considerable regression of hepatic steatosis since 91.7% of patients with grade II NAFLD have been successfully treated to grade I or normative liver echogenicity. (Anand, 2025)

- **Anxiety and Depression**

The study conducted now also revealed significant decrease in the scores for anxiety (47.0%) and depression (47.3%). Large effect sizes (d = 1.49 for anxiety and d = 1.57 for depression) for both conditions are an evidence of considerable psychological benefit from the intervention. Night shift workers, especially information technology professionals, are at risk of anxiety and depression due to disturbances in circadian rhythm, stress caused by work, lack of sleep and prolonged work-related strain (Bhargav et al., 2022). The results concerning psychological improvement coincide with findings on Rajayoga meditation (Jain et al., 2025) and integrated yoga and Varma therapy (Selvam & Yoganandhan, 2025).

- **Mechanism of Therapeutic Action**

The combination used seems to have helped in improving psychological well-being thus complementing the findings on changes in occupational stress, cortisol, metabolic and liver functions. Rajayoga meditation helps in improving emotional regulation, positive thinking and mental strength by means of cognitive restructuring and increased self-awareness. Yoga is known to improve balance in the autonomic nervous system through physical movements, breathing and relaxation, causing secretion of endorphins and other neurochemicals responsible for psychological well-being. Varma therapy also helps in promoting relaxation and balance in neuromuscular system by stimulating particular vital points.

- **Comparisons with Previous Studies**

The results of the current study corroborate previous literature indicating that yoga and meditation decrease occupational stress, improve metabolic parameters, and increase the quality of life (Ross & Thomas, 2010; Cramer et al., 2016; Telles et al., 2020). The magnitude of the positive changes recorded in this research is similar to or exceeds the ones documented in previous studies due to the complementary effects produced by the intervention program. Although there is scarce data on the effectiveness of Varma therapy, it seems that the combination of Rajayoga meditation, yoga, and Varma therapy yields additional benefits in treating NAFLD, as evidenced by previous research on integrated yoga and Varma therapy (Vijayakumar & Vijay, 2025; Saravanabhava et al., 2026).

- **Clinical Relevance and Public Health Relevance**

The findings of this research have considerable clinical relevance concerning the treatment of NAFLD in high-risk occupational populations. The integrated intervention represents an effective, safe, and non-pharmacological treatment method complementing the standard medical therapy. The improvement in stress levels, liver function, and overall metabolic status allows addressing the multicomponent nature of NAFLD from a clinical perspective and achieving the therapeutic effect. The significant reduction in hepatic steatosis detected in the patients indicates the possibility of altering.

In terms of public health, this research favors the use of workplace wellness interventions for Information Technology professionals, thus helping to minimize the occurrence of disease conditions as a result of occupational stress. This intervention provides a cost-effective way that can be utilized in occupational health settings for the welfare of both the employees' health and organizational performance.

Conclusion

- **Summary of Findings**

Based on the current research, the integrative intervention of Rajayoga meditation, yoga, and Varma therapy has proven to be an efficient complementary intervention for minimizing occupational stress and enhancing liver condition among night-shift IT professionals suffering from Non-Alcoholic Fatty

Liver Disease. The results from the current research have confirmed the alternative hypothesis while rejecting the null hypothesis. Significant changes were noted in all the outcome variables such as perceived stress, cortisol serum levels, lipid profile, anxiety, depression, and ultrasonographic grading of NAFLD.

- **Significance and Contribution of the Study**

This study provides evidence for the effectiveness of Rajayoga meditation, yoga, and Varma therapy in managing NAFLD. It demonstrates the role of integrative therapies in reducing occupational stress and improving mental well-being. The study highlights a non-pharmacological, safe, and cost-effective approach for NAFLD management. It contributes to the limited scientific evidence on Varma therapy in liver health and supports the implementation of workplace wellness programmes for night-shift IT professionals. The findings offer a foundation for future research on integrative medicine and lifestyle-related disorders.

- **Implications**

The findings support the incorporation of Rajayoga meditation, yoga, and Varma therapy into workplace wellness programmes and integrative healthcare practices for night-shift IT professionals. Further large-scale, multicentre randomized controlled trials with longer follow-up and advanced diagnostic assessments are warranted to confirm these findings and establish standardized clinical guidelines for the prevention and management of NAFLD through integrative mind-body therapies.

Limitations and Future Research

- **Limitations of the Study**
  - The study had a relatively small sample size of 60 participants
  - The 12-week intervention may not reflect long-term effects
  - Participants were limited to selected night-shift IT professionals
  - Lifestyle factors such as diet and physical activity may have influenced the outcomes
  - Ultrasonography has limited sensitivity for detailed liver assessment compared to advanced imaging techniques
  - The individual effects of each intervention component could not be determined separately
- **Future Research Suggestions**
  - Conduct larger multicentre randomized controlled trials with adequate sample sizes
  - Evaluate long-term intervention effects with extended follow-up periods (6-12 months)
  - Compare the individual effects of each intervention component through factorial design studies
  - Use advanced imaging techniques such as FibroScan or MRI for more accurate liver assessment
  - Include other high-risk occupational populations for comparative analysis
  - Assess the impact of lifestyle and occupational factors on intervention outcomes
  - Examine work performance and quality-of-life outcomes in addition to clinical parameters
  - Develop standardized integrative treatment protocols for clinical implementation

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