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A STUDY ON THE EFFICACY OF YOGIC INTERVENTION IN THE MANAGEMENT OF FEMALE CLIMACTERIC

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ABSTRACT

Women undergo hormone imbalances and other physical and psychological changes throughout menopause and the years leading up to it. Hot flashes, nocturnal sweats, mood changes, and sleep issues can lower a woman's quality of life. HRT is the standard treatment, but yoga and other alternative therapies are becoming more popular for their holistic benefits and potential efficacy. Yoga, which incorporates asanas, pranayama, and meditation, helps reduce climacteric symptoms by improving physical health, mental clarity, and emotional balance.

This study intends to evaluate the effectiveness of yoga interventions in controlling climacteric symptoms in women going through perimenopause and menopause. The study evaluates how yoga reduces symptoms like hot flashes and sleep disruptions, as well as its impact on psychological well-being, including stress reduction and mood stability. Additionally, this study explores how yoga affects hormone balance and autonomic nervous system modulation during menopause. The study aims to assess the long-term impact of yoga on symptom management and quality of life.

This research compares the effectiveness of Hatha, Vinyasa, and Restorative yoga practices in reducing symptoms and improving general well-being. This study intends to enhance symptom management during menopause by investigating the possible advantages of yoga for women in the climacteric phase. The findings may improve healthcare procedures and provide women with a supplemental therapy to enhance their quality of life at this crucial life period.

Keywords: yogic interventions, climacteric symptoms, menopause, effectiveness.

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1. Introduction

Women undergo major physiological changes throughout the climacteric phase, which includes menopause and its prelude. The phase causes endocrine changes, menstrual stoppage, and other physical and psychological changes. The women involved usually face challenges that affect their quality of life and well-being. Traditional medical treatments like HRT have relieved symptoms, but interest in complementary and alternative treatments like yogic interventions has grown due to their efficacy and holistic approach. Yoga, an ancient Indian practice, uses asanas, pranayama, meditation, and relaxation to regulate health. Advocates say frequent practice has benefits beyond physical health. Yoga improves fitness, mental clarity, and emotional equilibrium. It may also alleviate climacteric symptoms. To discuss the efficacy of yogic intervention, one must first know what climacteric symptoms women experience. Climacteric symptoms include hot flashes, nocturnal sweating, mood changes, sleep difficulties, vaginal dryness, and altered cognition. These symptoms can greatly affect daily life, social interactions, and quality of life (Chattha,Raghuram, Venkatram, & Hongasandra, 2008)

Multiple yoga approaches can cure climacteric symptoms holistically. Yoga reduces climacteric stress through mindfulness and relaxation. Menopausal symptoms are worsened by stress. Yoga may influence hormonal balance, notably cortisol and adrenaline levels, which may affect hot flashes and other symptoms. Flexing, strengthening, and increasing cardiovascular health in yoga helps menopausal women adapt their metabolism and body composition. Meditation, conscious breathing, and exercise improve mind-body connection. This can aid ladies in managing symptoms and themselves throughout the climax. Since yoga emphasises relaxation and awareness, it can minimise menopause mood swings, anxiety, and melancholy. Regular yoga enhances women's mental health and quality of life, research reveals. Sleep problems are common throughout menopause. Relaxation and sleep-promoting asanas boost sleep quantity and quality. Nutrition and exercise will promote bone health, but yoga's standing postures and stress reduction may be especially useful after menopause. Yoga may help women manage climacteric symptoms. Yoga's postures, breathwork, meditation, and awareness seem to support such claims. Yoga improves quality of life and reduces hot flashes, mood swings, and sleep interruptions. More research is needed to understand yoga's advantages and recommend practices (Swain, Nanda, & Das, 2021)

2. Literature Review

Melo & Costa (2018) conducted study on the influence of menopausal symptoms on women's quality of life. The study found that climacteric symptoms in women are linked to low self-esteem and reduced quality of life, resulting in issues in personal and professional relationships. We have statistics that support this claim. Health professionals, particularly nurses, play a crucial role in promoting women's education and assistance during this life stage. Indicators and climacteric symptoms may affect women's quality of life and biopsychosocial welfare. The presence of a competent specialist can provide relief from negative environments and even reverse them.

Swain, Nanda, and Das (2021) state that yoga treatments affected menopausal symptoms, quality of life, and hormone changes Menopause symptoms like hot flashes, mood swings, and sleep disruptions might reduce women's quality of life. Swain, Nanda, and Das (2021) examined a comprehensive yoga program pre- and post-intervention. Quality of life, menopausal symptoms, and hormone levels improved significantly. This study supports the use of non-pharmacological therapy like yoga to treat menopause symptoms and enhance women's health. The findings underline the necessity for holistic health treatments to handle menopause's various issues.

Ponde, Agrawal, and Hussaini (2019) compared yoga treatment and aerobic exercise on climacteric symptoms, perceived stress, and quality of life in perimenopausal women. Perimenopausal women endure emotional and physical distress that can lower their quality of life, which the study addresses. One group did yoga therapy and the other aerobics. Both therapies reduced climacteric symptoms and felt stress, although yoga therapy improved quality of life more. This study shows that yoga can treat perimenopausal symptoms and improve mental health holistically. The study emphasises the necessity to investigate non-pharmacological therapies for women's health during this transitional period.

Cramer, Peng, and Lauche (2018) reviewed and meta-analyzed how yoga relieves menopause symptoms. This systematic review covers menopause problems such vasomotor symptoms, mental illnesses, and quality of life. Randomised controlled trials by Cramer, Peng, and Lauche (2018) demonstrated that yoga reduces menopausal symptoms. Yoga improves mental health and quality of life, according to the review. Yoga may help menopause symptoms, according to research. Statistics suggest that yoga promotes relaxation and emotional balance beyond physical activity. This meta-analysis promotes holistic wellbeing for women and calls for more research on menopausal yoga practices.

Gangadharan (2024) explored how yoga improves postmenopausal women's symptoms and quality of life. Numerous literature reviews on how yoga affected menopausal symptoms such hot flashes, anxiety, and sleep disruptions were objectively reviewed. Yoga consistently reduced the symptoms listed, enhancing participants' quality of life. Gangadharan (2024) says yoga decreases stress and boosts mood. According to the study, yoga is a holistic treatment for menopausal women that is effective, alternative, or extra to established treatments. Healthcare providers may use yoga to treat menopausal women's problems, spurring additional research and refining of yoga approaches.

Naragatti investigates yoga's menopausal benefits. The study found that menopausal women have heat flashes, emotional fluctuations, and sleep issues. Naragatti says asanas, pranayama, and meditation help women manage symptoms and feel better. According to research, yoga reduces physical pain, mental stress, and emotional instability. This study recommends yoga for menopause quality of life. According to study, healthcare facilities should offer yoga as a menopause complement.

Jorge, Santaella, Pontes, Shiramizu, Nascimento, Cabral, & Ribeiro (2016) conducted a randomised controlled trial on Hatha yoga and menopausal symptoms and quality of life. A cohort of menopausal women participated in a standardised Hatha yoga program and were assessed before and during the intervention. In addition to reducing menopause symptoms including hot flashes and mood swings, the study improved quality of life. Jorge, Santaella, Pontes, Shiramizu, Nascimento, Cabral, & Ribeiro (2016) highlighted Hatha yoga's ability to alleviate menopause symptoms and improve physical and mental health. This study supports complementary therapies in women's health and suggests that frequent yoga practice may help manage menopausal symptoms. The findings support adding yoga to established treatment paradigms to improve menopause health.

3. Methodology

3.1. Research Design

This research is a Randomised Controlled Trial (RCT) aimed at assessing the impact of a structured yoga intervention on menopausal symptoms, thyroid hormone levels, body mass index (BMI), and general quality of life in menopausal women. The trial was executed over six months, with evaluations at baseline and conclusion of the research period.

3.2. Study Population

The study focused on Mangalore and Bangalore menopausal women aged 40–55. Local community centres, health clinics, and web marketing recruited participants. Women had to be within the age range, have hypothyroidism, and have menopausal symptoms such hot flashes, sleep difficulties, anxiety, and self-reported stress. To ensure participant safety and suitability, women with clinically documented cardiovascular, neurological, or psychological disorders and orthopaedic abnormalities that could hinder yoga practice were excluded. Participants could not smoke, drink, or have a history of hysterectomy, hypertension, arthritis, or surgery in the prior six months. This research approach allowed for targeted and secure yoga-menopausal symptom research.

3.3. Sample Size and Allocation

The study featured 100 participants, 50 per group. A sealed opaque technique randomly allocated two groups: the Intervention Group received yoga and standard medical therapy, and the Control Group received conventional medical care and daily walking exercises. Intervention Group participants underwent supervised 60-minute yoga classes four days a week rotating day for the first month. To improve self-practice, participants were urged to practise yoga three more days in the first month and at home in the second. Telephone follow-up every 15 days ensured intervention adherence. Sukhasana, Vajrasana, and Trikonasana were done for 30 minutes following 5 minutes of Sukshma Vyayama. Participants did 15 minutes of Nadishuddhi, Ujjayi, and Bhramari pranayama, 10 minutes of Shavasana, and 12 rounds of Pranava. Structured management improved menopause symptoms. Control group members received thyroid hormones and daily 30-minute walks without yoga. Both groups had twice-monthly intervention adherence checks. The intervention group practiced yoga with support and a diary. Outcome assessor was blinded to group allocation to prevent data collection and analytic bias, but yoga course researcher was not. A standardised digital scale and stadiometer recorded primary outcomes, including BMI changes, at baseline and end of study. Standardised lab assays measured TSH, T4, and T3 at baseline and six months. Baseline and end-of-study oestrogen levels and quality of life using validated questionnaires like Greene's Climacteric Scale for menopausal symptoms were secondary objectives.

3.4. Data Collection and Analysis

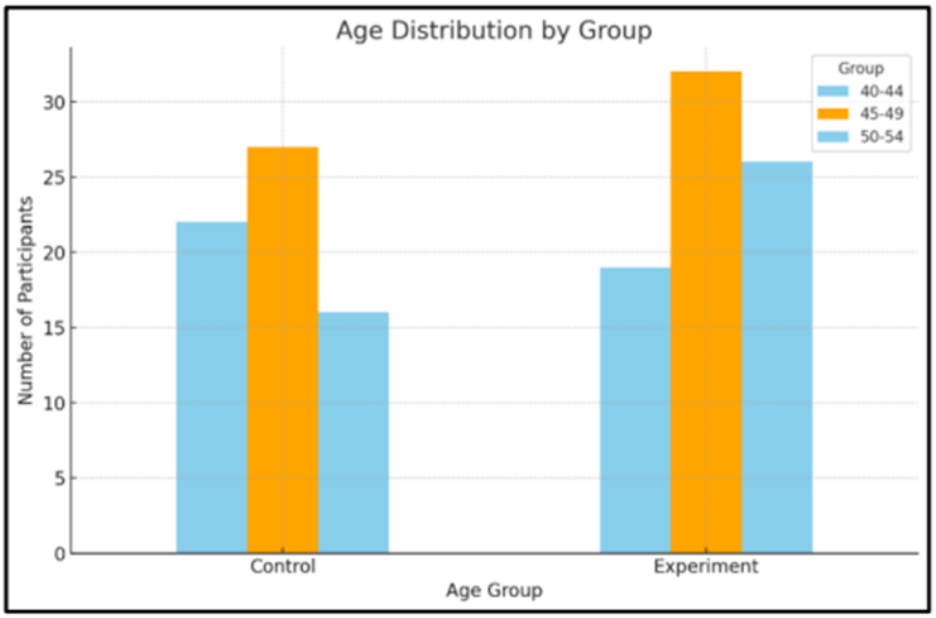
At two different times in time, namely the baseline (pre-intervention) and the six-month mark following the intervention, data was collected. Both the primary outcomes, which included changes in body mass index (BMI) and levels of thyroid hormone, as well as the secondary outcomes, which included improvements in quality of life and oestrogen levels, were recorded for every participant. For the purpose of the analysis, the appropriate statistical software package was utilised. The differences between the intervention group and the control group were analysed using chi-square tests for categorical variables and an independent t-test for continuous data. Chi-square tests were used for continuous variables. The statistical significance of a p-value less than 0.05 was determined to be met.

4. Results and Findings

4.1. Age Distribution

The study examined the age distribution of participants in three age groups: 40-44, 45-49, and 50-54 years, both in the control and experimental groups. The goal of this analysis was to comprehend the demographics of the study population and assure comparability between groups. In the control group, 33.8% of individuals were aged 40-44, a significant proportion. The bulk of control group individuals (41.5%) were aged 45-49. Finally, 24.6% of participants were aged 50-54. The distribution indicates a balanced age range, with a little predominance of 45-49 year olds. 80 In the experimental group, 24.7% of individuals were aged 40-44, slightly lower than in the control group. The 45-49 age group made up 41.6% of the experimental group, similar to the control group. Interestingly, 33.8% of participants in the 50-54 age range were in the experimental group, compared to 24.6% in the control group. This distribution suggests an experimental group with a modest lean towards older members. Overall, the control and experimental groups have similar demographics, with the majority of individuals in both groups aged 45-49. In the experimental group, older people (50-54) are marginally more prevalent than in the control group. This balance across age groups strengthens comparisons and shows that observed differences in outcomes are not solely due to age disparities.

Age Group	Control Count (%)	Experiment Count (%)
40-44	22 (33.8%)	19 (24.7%)
45-49	27 (41.5%)	32 (41.6%)
50-54	16 (24.6%)	26 (33.8%)



4.2. Descriptive Statistics and Comparative Analysis of Baseline Characteristics

The study participants' baseline characteristics were assessed to ensure comparability between the control and experimental groups before the yoga session. Participants in the control group had a mean age of 46.77 years (SD ± 4.49) while those in the experimental group had a slightly higher mean age of 47.64 years (SD ± 4.36). Both groups' age ranges were 40-55 years, with no significant difference (p = 0.2339), indicating a similar age distribution.

The pre-intervention weight differed somewhat between groups, with the control group averaging 72.60 kg (SD ± 10.78) and the experimental group averaging 69.80 kg (SD ± 11.26). Both groups had identical weight ranges, with no significant difference (p = 0.1220). The pre-intervention body mass index (BMI) was 30.64 (SD ± 4.56) in the control group and 29.47 (SD ± 4.72) in the experimental group, with similar ranges. Statistics showed no significant difference (p = 0.1229). Additionally, thyroid hormone levels were measured. The pre-intervention thyroid-stimulating hormone (TSH) levels were similar between groups, with a mean of 7.67 (SD ± 1.93) in the control group and 8.08 (SD ± 1.92) in the experimental group, with no significant difference (p = 0.1938). Pre-intervention T4 levels were 4.38 (SD ± 1.02) in the control group and 4.50 (SD ± 0.98) in the experimental group, with no significant difference (p = 0.3451). Pre-intervention T3 levels were similar between groups, with a mean of 1.76 (SD ± 0.56) for the control group and 1.91 (SD ± 0.58) for the experimental group (p = 0.1457). The baseline characteristics of the control and experimental groups showed no significant changes in age, weight, BMI, or thyroid hormone levels before the intervention. This balance in baseline variables validates later comparisons to evaluate the yoga intervention's benefits.

Variable	Control (Mean ± SD)	Experiment (Mean ± SD)	Control Range	Experiment Range	p-value
Age	46.77 ± 4.49	47.64 ± 4.36	(40.0 - 55.0)	(40.0 - 55.0)	0.2339
Weight Pre	72.60 ± 10.78	69.80 ± 11.26	(52.44 - 89.29)	(50.0 - 89.41)	0.1220
BMI pre	30.64 ± 4.56	29.47 ± 4.72	(21.79 - 37.87)	(20.77 - 37.76)	0.1229
TSH-Pre	7.67 ± 1.93	8.08 ± 1.92	(4.52 - 10.9)	(4.51 - 10.95)	0.1938
T-4-Pre	4.38 ± 1.02	4.50 ± 0.98	(2.88 - 7.02)	(3.02 - 6.95)	0.3451
T-3-Pre	1.76 ± 0.56	1.91 ± 0.58	(0.90 - 2.8)	(0.9 - 2.8)	0.1457

4.3. Comparative Analysis After Yoga Intervention

We provide descriptive statistics on the study population's baseline characteristics, divided into control and experimental groups. Thyroid hormone levels (TSH, T4, T3), age, and BMI are compared before and after the intervention. The experimental group had a mean age of 47.64 years (SD ± 4.36), while the control group had 46.77 years (SD ± 4.49). Before and after intervention, BMI was measured (84). In the control group, the baseline BMI was 30.64 (SD ± 4.56) and the post-intervention BMI was 30.46 (SD ± 4.52), indicating no significant change A study found that yoga intervention significantly reduced BMI from 29.47 (SD ± 4.72) to 27.58 (SD ± 4.44), with a p-value of 0.0001. Thyroid function was assessed by TSH, T4, and T3. Before and after the intervention, the control group had stable TSH levels (7.67 ± 1.93, 7.73 ± 1.95), while the experimental group showed a significant drop (8.08 ± 1.92 to 6.77 ± 1.74, p-value 0.0020). The intervention considerably improved T4 and T3 in the experimental group. Yoga changed BMI, TSH, T4, and T3 considerably between experimental and control groups. To prepare for study on the intervention's health and quality of life effects, this analysis describes baseline attributes and changes.

4.4. Analysis of Changes from Baseline to End of Study

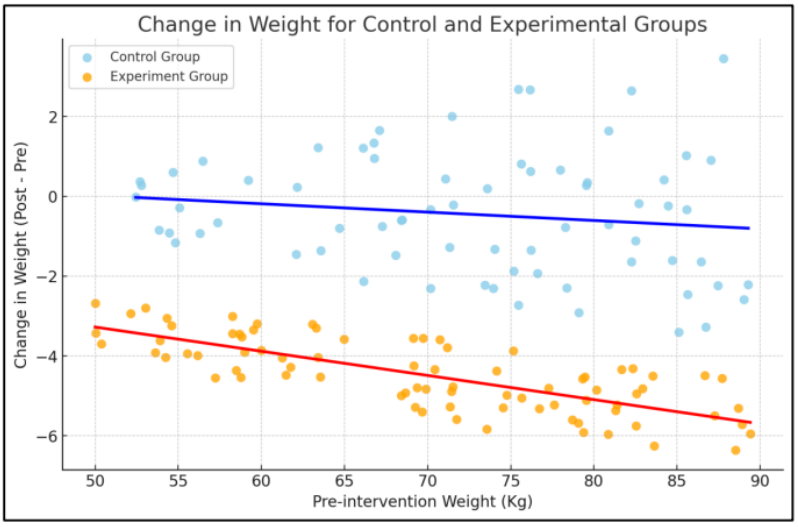
Results indicate that before intervention, the control group had a mean weight of 72.60 kg (SD ± 10.78) while the experimental group had a mean weight of 69.80 kg (SD ± 11.26). The p-value for this comparison was 0.1220, showing no significant difference in baseline weights across groups. It appears that both groups had similar weights before the intervention. Following the intervention, the control group saw a minor weight loss of 72.15 kg (SD ± 10.67), while the experimental group experienced a significant weight loss of 65.33 kg (SD ± 10.59). The post-intervention comparison p-value was 0.0001, indicating high significance ($p < 0.05$). A statistically significant difference in post-intervention weights was found between the control and experimental groups (85). Significant weight loss in the experimental group compared to the control group indicates that the yoga intervention was helpful in attaining weight loss.

Results demonstrate that the yoga intervention was effective in reducing weight in the experimental group, supporting the hypothesis of meaningful weight decreases across the study period. A paired t-test might study weight changes in each group before and after the intervention, considering the paired nature of pre- and post-intervention data for each participant. This would further support the effectiveness of the intervention.

Change In Weight for Control and Experimental Groups

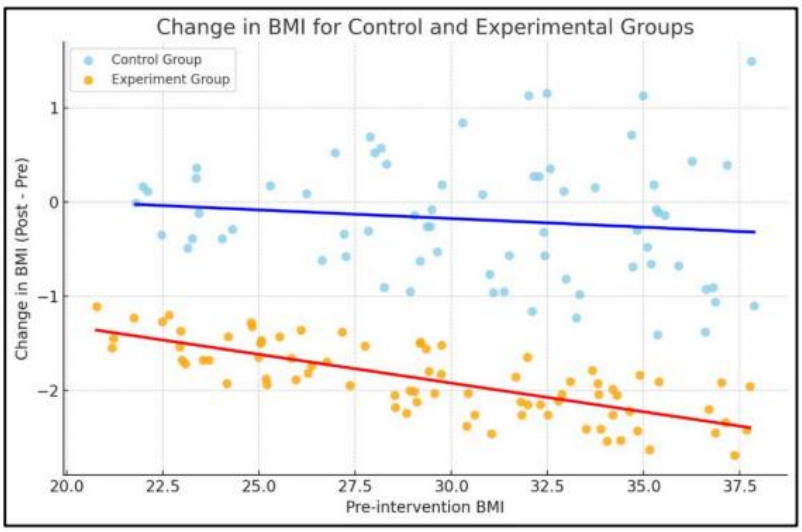
The scatter plot demonstrates how yoga intervention affected participants' weight across the study period in control and experimental groups. Participant pre-intervention weight is compared to post-intervention weight minus it. This graph shows weight change trends for both groups using regression lines. The experimental group (orange points, red regression line) lost more weight than the control group (sky-blue points, blue regression line). The regression line for the experimental group's downward slope shows that yoga participants lost more weight. The control group's regression line is flat, indicating little weight change. This graphic shows that the yoga intervention caused the experimental group to lose more

weight than the control group. The experimental group lost more weight than the control group, showing that yoga may help menopausal women manage weight. The scatter figure shows weight change between groups, supporting the statistical finding that yoga improved weight loss.



Change In BMI for Control And Experimental Groups

A scatter plot displays the yoga intervention's BMI impacts on control and experimental groups. Every data point shows a participant's pre- and post-intervention BMI in negative. The graph shows regression lines for both groups' BMI changes. The findings show group differences. Yoga frequently reduces weight in the experimental group (orange dots and red regression line). The control group (sky-blue points and blue regression line) has a flat trend, indicating low BMI rises. The regression line steepened downward, showing that the experimental group had a much lower average BMI than the control group. Yoga 88 helped manage weight as the experimental group had a larger BMI drop. The scatter figure reveals that yoga reduced BMI in the experimental group but not the control group. These findings support statistical evidence that yoga may help menopausal women manage BMI.

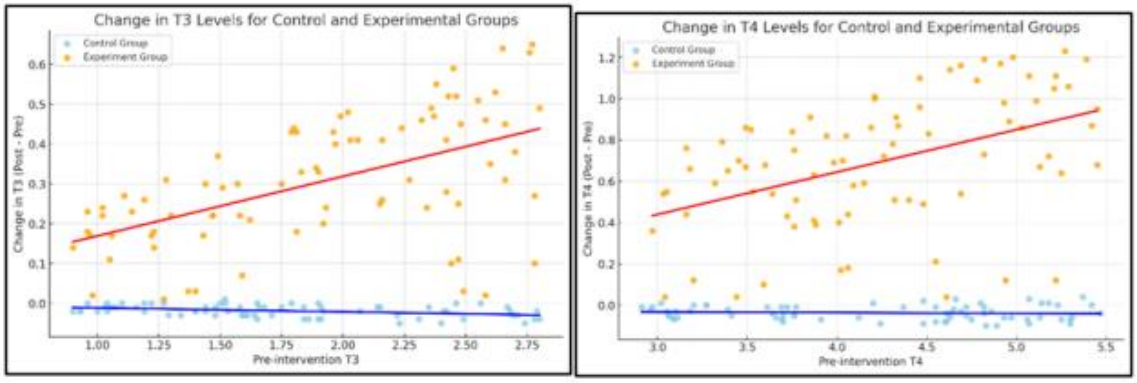


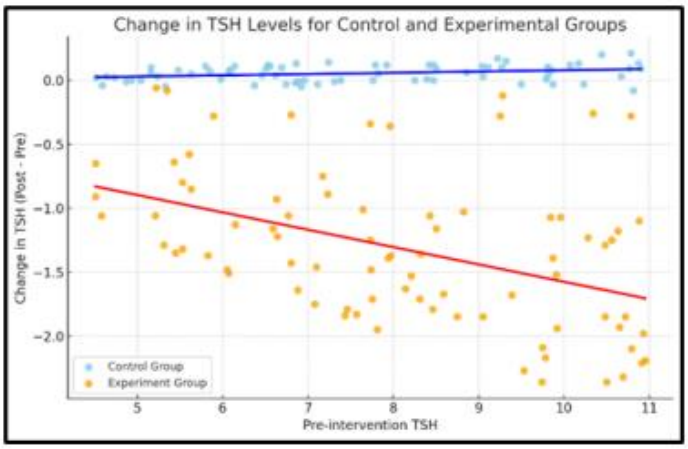
Change in Thyroid Levels for Control and Experimental Groups

In the first scatter plot, participants' pre-intervention T3 levels are compared to their post-intervention T3 levels. Regression lines show that the experimental group (orange points and red line) had a greater increase in T3 levels than the control group (sky-blue points and blue line), which had a very flat regression line. The yoga intervention may have improved T3 levels in the experimental group.

T4 alterations are shown in the second scatter figure. The red regression line indicates a modest increase in T4 levels in the experimental group, while the blue regression line remains practically fixed in the control group. A slight increase in T4 levels was observed in the experimental group post-intervention, but less significant than the change in T3 levels.

TSH changes are shown in the third scatter figure. The experimental group's TSH levels decreased post-intervention, as indicated by the negative slope of the red regression line. In comparison, the control group's regression line is nearly horizontal, indicating minimal TSH level variation. This pattern implies that the yoga intervention reduced TSH levels in the experimental group, presumably indicating improved thyroid function. These plots show that the yoga intervention significantly reduced TSH levels and positively influenced T3 and T4 levels in the experimental group compared to the control group.





Cohen's d was calculated to measure the intervention's impact by comparing changes between control and experimental groups for each primary and secondary outcome.

- Weight Change: Yoga intervention has a significant effect on weight reduction (Cohen's d = 3.27).
- BMI Change: The effect size (Cohen's d) is 3.27, confirming a significant drop in BMI, supporting weight change findings.
- T3 Change: The intervention had a significant favourable effect on boosting T3 levels in the experimental group compared to the control group (Cohen's d = -2.77).
- The effect size (Cohen's d) for T4 Change is -3.15, indicating a significant benefit for the experimental group with higher T4 levels.
- TSH Change: The experimental group showed a significant decrease in TSH levels compared to the control group (Cohen's d = 3.14).

Effect sizes indicate a considerable impact of yoga on all outcomes, especially weight, BMI, T3, T4, and TSH levels. The intervention was highly effective in reaching its desired results, as evidenced by substantial effect sizes.

4.5. Regression Analysis of Predictors for Outcome Improvements

BMI, thyroid hormone levels (T3, T4, TSH), and quality of life scores predicted primary and secondary outcome improvement in multiple linear regression. Age, weight, group assignment (control or experimental), and pre-intervention T3, T4, and TSH helped predict.

All regression findings were significantly predicted by experimental or control group assignment. The regression model for BMI decrease found pre-intervention weight and group assignment as significant predictors ($p < 0.001$, $R^2 = 0.774$), accounting for 77.4% of variation. The group assignment alone predicted T3 and T4 differences ($p < 0.001$), explaining 78.9% and 80.1% of variation, respectively. The regression model for TSH change identified group assignment and pre-intervention TSH levels as significant predictors ($p < 0.001$, $R^2 = 0.820$), accounting for 82.0% of variation According to studies, yoga lowered BMI, TSH, T3 and T4 levels and improved primary and secondary results. Yoga controls weight and thyroid function in menopausal women, confirming its value.

Outcome	Significant Predictors	R-squared	p-value (Significant Predictors)
BMI Change	Pre-intervention Weight, Group Assignment	0.774	< 0.001, < 0.001
T3 Change	Group Assignment	0.789	< 0.001
T4 Change	Group Assignment	0.801	< 0.001
TSH Change	Group Assignment, Pre-intervention TSH Level	0.820	< 0.001, < 0.001

5. Discussion & Conclusion

The randomised controlled experiment examined how organised yoga affected menopausal symptoms, thyroid hormone levels, BMI, and quality of life in women. Women 40–55 were randomly given yoga or conventional medical care and daily walking. Greene's Climacteric Scale checked BMI, thyroid hormone levels (TSH, T3, and T4), and quality of life six months before and after intervention.

Key Findings: Yoga improved primary and secondary outcomes. Post-intervention, the experimental group had a considerably lower BMI than the control group (mean = 27.58 (SD ± 4.44) vs. 30.46 (SD ± 4.52). Yoga may help menopausal women lose weight without drugs. The experimental group lost a lot of weight, suggesting yoga may improve health and composition. In the experiment, yoga reduced TSH and increased T3 and T4. TSH levels significantly decreased in the experimental group (pre-intervention mean: 8.08 (SD ± 1.92) to 6.77 (SD ± 1.74) ($p = 0.0020$), while the control group did not change significantly. The experimental group exhibited higher T3 and T4 (0.0024 and 0.0003). Yoga may improve thyroid function and reduce medication in menopausal hypothyroidism. Effect Sizes and Predictors: Yoga significantly raised primary outcome effect size estimates (Cohen's d). Cohen's d for weight/BMI changes was 3.27, significant. Yoga reduced thyroid hormones T3 and T4 by 2.77 and 3.15. The experimental group's Cohen's d was 3.14, indicating a substantial TSH drop. Effect sizes show yoga controls thyroid and weight (93). Multiple linear regression strongly predicted control or experimental group BMI, T3, T4, and TSH variations. Group assignment and pre-intervention weight strongly predicted BMI decline ($R^2 = 0.774$), explaining 77.4% variation. Significant changes in T3 and T4 levels were predicted by group assignment alone ($R^2 = 0.789$ and 0.801, respectively), while combined group assignment and pre-intervention TSH levels predicted TSH changes ($R^2 = 0.820$). Yoga intervention alters. Inferences, implications Yoga reduces menopausal symptoms by improving BMI and thyroid function, according to one study. Yoga reduced menopausal hypothyroidism patients' BMI, TSH, T3, and T4, suggesting a non-invasive treatment. Big impact sizes show these outcomes' therapeutic potential.

Yoga helps with weight loss, hormone balance, and stress. A study suggests adding yoga to menopause treatment for mental and physical health. Organised yoga improves menopausal women's BMI and thyroid. Yoga may help menopause due to huge effect sizes, significant experimental group alterations, and group assignment predictive value. Long-term yoga effects on menopause and other demographics needs study..

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