

Effect of Ujjayi Pranayama on Thyroid Hormone Profile and Blood Pressure in Adult Women with Hypothyroidism Before and After Intervention

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Abstract: ***Background:** Hypothyroidism is a prevalent endocrine disorder among women and is associated with metabolic, cardiovascular, and psychological disturbances. Complementary approaches such as yogic breathing practices (pranayama) are increasingly explored as adjunct therapies. Ujjayi pranayama is a slow, controlled breathing technique known to influence autonomic balance and endocrine function. **Objective:** To evaluate the effect of an 8-week Ujjayi pranayama intervention on thyroid hormone levels (FT3, FT4, TSH) and blood pressure in adult women with hypothyroidism. **Methods:** An interventional study was conducted on 30 adult women (aged 25–55 years) diagnosed with primary hypothyroidism. Participants practiced Ujjayi pranayama for 15 minutes daily for 8 weeks following supervised training in a yoga charitable trust at Vijayawada. Serum FT3, FT4, TSH, systolic blood pressure (SBP), and diastolic blood pressure (DBP) were measured at baseline and post-intervention. Data were analysed using paired t-tests, with significance set at $p < 0.05$. **Results:** Statistically significant improvements were observed post-intervention. FT3 and FT4 levels increased significantly, while TSH levels decreased markedly ($p < 0.001$). Both SBP and DBP showed significant reductions after the intervention ($p < 0.001$). **Conclusion:** Eight weeks of regular Ujjayi pranayama practice was associated with significant improvements in thyroid hormone profile and blood pressure in adult women with hypothyroidism. Ujjayi pranayama may serve as a beneficial adjunct to conventional management. Further randomized controlled trials are recommended.*

Keywords: Hypothyroidism, Ujjayi pranayama, Thyroid hormones, Blood pressure, Yoga therapy

1. Introduction

Hypothyroidism is a common endocrine disorder characterized by insufficient thyroid hormone production, leading to metabolic and cardiovascular disturbances. Women are more frequently affected, and many continue to experience symptoms despite pharmacological treatment.

Emerging evidence suggests that mind–body interventions such as yoga and pranayama may positively influence endocrine and autonomic regulation (Bhandari et al., 2024). Slow breathing practices have been shown to enhance parasympathetic activity and reduce stress, which may indirectly affect the hypothalamic–pituitary–thyroid (HPT) axis (Streeter et al., 2012).

Ujjayi pranayama, a controlled breathing technique involving glottal constriction, is believed to stimulate the throat region and improve vagal tone. Previous studies and protocols indicate potential improvements in thyroid function following yoga-based interventions (Nilkantham et al., 2023).

2. Materials and Methods

2.1 Study Design study conducted over a period of 8 weeks at Shadguru Shantisudha charitable trust in Vijayawada, before and after intervention.

2.2 Participants Thirty adult women diagnosed with primary hypothyroidism were recruited.

Inclusion criteria:

- Females aged 25–55 years

- Diagnosed primary hypothyroidism
- On stable medication or no change in medication during the study
- Willingness to practice pranayama daily

Exclusion criteria:

- Pregnancy or lactation
- History of thyroid surgery
- Severe cardiovascular, respiratory, or psychiatric illness
- Participation in other structured yoga programs

2.3 Intervention Protocol

Participants received supervised training in Ujjayi pranayama for one week. The intervention protocol consisted of:

- Duration: 15 minutes per day
- Frequency: Daily for 8 weeks
- Posture: Comfortable seated position
- Technique: Slow inhalation and exhalation through the nose with gentle throat constriction producing an audible breath
- Weekly supervised sessions ensured correct technique and adherence. Participants maintained daily practice logs.

2.4 Outcome Measures

Assessments were conducted at baseline and after 8 weeks.

Primary outcomes:

- Free T3 (FT3, pg/mL)
- Free T4 (FT4, ng/dL)
- Thyroid Stimulating Hormone (TSH, μ IU/mL)

Secondary outcomes:

- Systolic Blood Pressure (SBP, mmHg)
- Diastolic Blood Pressure (DBP, mmHg)

Blood pressure was measured in a seated position after 5 minutes of rest, using the average of two readings.

2.5 Statistical Analysis

Data were expressed as mean ± standard deviation. Pre- and post-intervention values were compared using paired t-tests. Statistical significance was set at $p < 0.05$. Effect sizes were calculated using Cohen’s d.

3. Results

3.1 Thyroid Hormone Profile

Parameter	Baseline (Mean ± SD)	Post-Intervention (Mean ± SD)	p-value
FT3 (pg/mL)	1.95 ± 0.23	2.53 ± 0.31	< 0.001
FT4 (ng/dL)	0.70 ± 0.12	1.00 ± 0.15	< 0.001
TSH (µIU/mL)	8.36 ± 1.54	3.72 ± 2.13	< 0.001

3.2 Blood Pressure

Parameter	Baseline (Mean ± SD)	Post-Intervention (Mean ± SD)	p-value
SBP (mmHg)	135.5 ± 8.4	128.3 ± 9.9	< 0.001
DBP (mmHg)	84.3 ± 5.8	79.0 ± 6.1	< 0.001

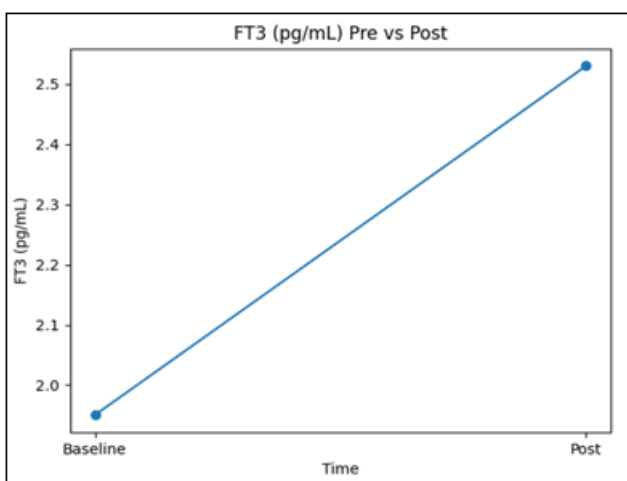


Figure 1: Changes in serum FT3 levels before and after 8 weeks of Ujjayi pranayama intervention.

The graph in figure 1, demonstrates a clear increase in FT3 levels following the 8-week Ujjayi pranayama intervention. This improvement suggests enhanced peripheral conversion of T4 to T3, which is essential for metabolic activity. The increase in FT3 may be attributed to improved autonomic regulation and reduced stress, both of which influence thyroid hormone metabolism. These findings support previous research indicating that yogic breathing practices can positively modulate endocrine function.

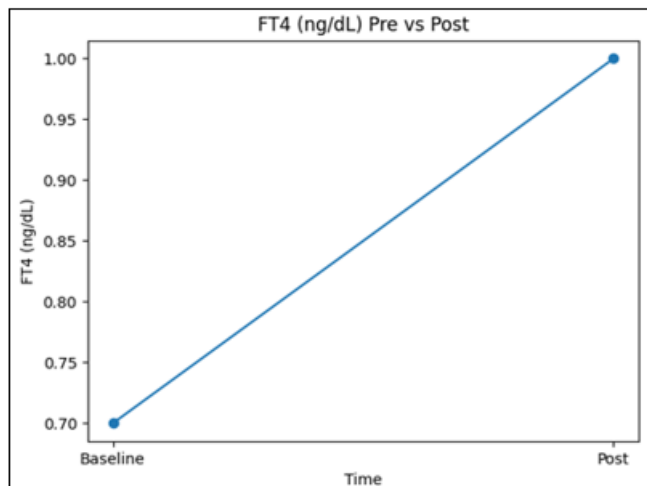


Figure 2: Changes in serum FT4 levels before and after intervention.

The graph in figure 2 shows an increase in FT4 levels was observed post-intervention, indicating improved thyroid hormone availability. The rise in FT4 suggests enhanced thyroid gland activity or improved hormonal regulation through neuroendocrine pathways. Ujjayi pranayama, by promoting relaxation and improving circulation in the neck region, may contribute to better thyroid function. This aligns with earlier studies showing that yoga practices can support endocrine balance.

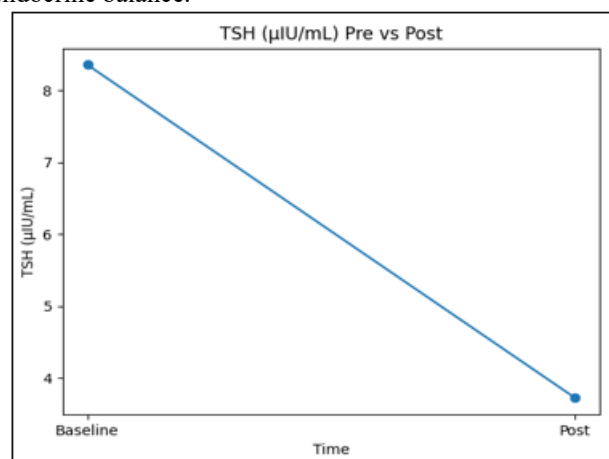


Figure 3: Reduction in serum TSH levels following Ujjayi pranayama practice

The graph in figure 3 shows a significant reduction in TSH levels after the intervention, which is a key indicator of improved thyroid function. Elevated TSH is a hallmark of hypothyroidism; therefore, its reduction toward normal levels suggest improved feedback regulation of the hypothalamic–pituitary–thyroid (HPT) axis. The findings imply that Ujjayi pranayama may contribute to restoring hormonal equilibrium, possibly through stress reduction and vagal stimulation.

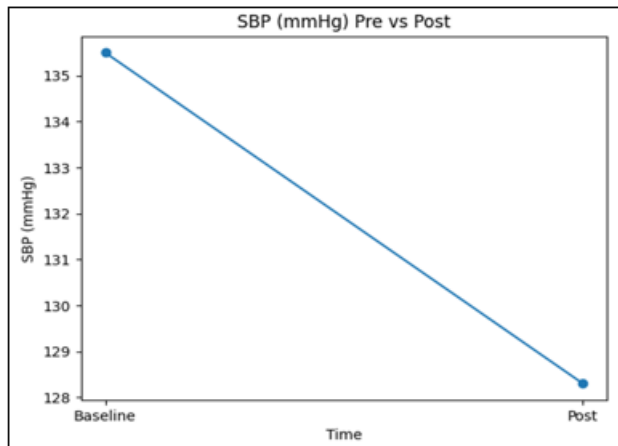


Figure 4: Changes in systolic blood pressure (SBP) pre- and post-intervention.

Figure 4 shows a noticeable decrease in systolic blood pressure was observed following the intervention. This reduction may be attributed to enhanced parasympathetic activity and decreased sympathetic drive induced by slow, controlled breathing. Ujjayi pranayama is known to improve cardiovascular efficiency and reduce stress-related hypertension, which is particularly beneficial in hypothyroid individuals who often exhibit altered cardiovascular function.

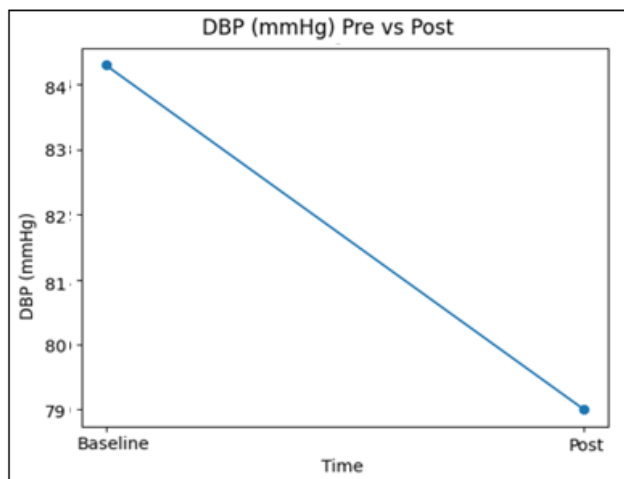


Figure 5: Changes in diastolic blood pressure (DBP) pre- and post-intervention.

Figure 5 shows the reduction in diastolic blood pressure further supports the cardiovascular benefits of Ujjayi pranayama. Lower DBP reflects decreased peripheral vascular resistance and improved vascular relaxation. These changes are likely mediated through autonomic balance and reduced stress hormones. The findings reinforce the role of pranayama as an effective non-pharmacological intervention for improving cardiovascular health.

4. Discussion

The present study demonstrated significant improvements in thyroid hormone levels and blood pressure following Ujjayi pranayama practice. The reduction in TSH and increase in FT3 and FT4 suggest improved thyroid axis regulation.

These findings are consistent with earlier research indicating that yoga interventions may positively influence thyroid

function and metabolic parameters (Bhandari et al., 2024). The reduction in blood pressure may be explained by enhanced parasympathetic activation and reduced sympathetic drive associated with slow breathing techniques (Streeter et al., 2012).

Additionally, structured yoga modules for hypothyroidism have shown improvements in biochemical and psychological outcomes, supporting the role of pranayama as a complementary therapy (Nilkantham et al., 2023).

5. Conclusion

Ujjayi pranayama practiced daily for 8 weeks was associated with significant improvement in thyroid hormone profile and blood pressure in adult women with hypothyroidism. This practice may be considered a safe and effective adjunct to conventional medical management. Larger randomized controlled trials are warranted to confirm these findings.

References

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