



ISSN: 0975-833X

Available online at <http://www.journalcra.com>

INTERNATIONAL JOURNAL
OF CURRENT RESEARCH

International Journal of Current Research
Vol. 15, Issue, 03, pp.23979-23982, March, 2023
DOI: <https://doi.org/10.24941/ijcr.44922.03.2023>

RESEARCH ARTICLE

EFFECT OF YOGA PRACTICES ON HORMONAL FUNCTIONS (A META-ANALYSIS)

Sukanya Rawat¹, Chitra Chand² and Dhananjay Shaw^{3,*}

¹Research Scholar, Department of Physical Education and Sports Sciences(DPESS), University of Delhi, New Delhi, India; ²Research Scholar, Department of Yoga Science, University of Patanjali, Haridwar, Uttarakhand, India; ³Head, Department of Physical Education and Sports Sciences (DPESS),University of Delhi, New Delhi, India

ARTICLE INFO

Article History:

Received 24th December, 2022
Received in revised form
17th January, 2023
Accepted 15th February, 2023
Published online 19th March, 2023

Key words:

Yoga, Hormones, Athletes, Hormonal Functions, Meta-Analysis.

*Corresponding Author:
Dhananjay Shaw

Copyright©2023, Sukanya Rawat et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Sukanya Rawat, Chitra Chand and Dhananjay Shaw. 2023. "Effect of Yoga Practices on Hormonal Functions (A Meta-Analysis)". *International Journal of Current Research*, 15, (03), 23979-23982.

ABSTRACT

Background: Yoga appears to be a vital factor for improving health and behavior to achieve better physical and mental well-being. Therefore, it is now considered as a form of Complementary and Alternative Medicine (CAM). **Aim:** This meta-analysis attempts to find out the beneficial effect of yoga on various hormonal functions. The aim of the study is to evaluate the findings of the selected articles and to provide the comprehensive review regarding the effect of yoga on hormonal functions. **Methods and Materials:** The studies included were collected from online databases such as Science Direct, Pub Med, Wiley Online Library and Google Scholar. The articles published from January 2000 to December 2020 were considered. The main keywords were "yoga," "hormones" and "athletes". The total studies, identified were N=5866 and the studies included for critical analysis were N=10. **Results:** This study provides data in regards to statistics of male and female sample size, age of sample and duration of treatment protocol which are very useful and can be used as a basis for further investigation. **Conclusions:** In addition, the present study provides ample evidence to prove that yoga treatment improves and maintains hormonal functions.

INTRODUCTION

Yoga is a traditional way of life aiming to develop healthy body and mind by improving physiological and psychological functions (<https://www.mea.gov.in/in-focus-article.htm?25096/Yoga+Its+Origin+History+and+Development#:~:text=Introduction%20%3AYoga%20is%20essentially%20a,%20or%20to%20unite%20on%2002-01-2021;https://timesofindia.indiatimes.com/blogs/toi-edit-page/yoga-for-everyone-indias-gift-to-the-world-for-healthy-living-has-now-been-widely-adopted/> on 02-01-2021). It appears to be a vital factor for improving health and behavior to achieve better physical and mental well-being (<https://timesofindia.indiatimes.com/blogs/toi-edit-page/yoga-for-everyone-indias-gift-to-the-world-for-healthy-living-has-now-been-widely-adopted/> on 02-01-2021; Woodyard, 2021) Therefore, it is now considered as a form of Complementary and Alternative Medicine (CAM) (Sharma, 2013). In addition, it also plays an important role in the improvement and maintenance of hormonal functions of the body as proved by many studies conducted in the past few years (Martarelli, 2011; Chaturvedi et al., 2016; Eda, 2017; Eda, 2020; Karimi, 2015). Hormones are the chemical messengers of the body that help in controlling the major processes of the body such as metabolism, reproduction and many more (<https://medical-dictionary.thefreedictionary.com/Hormone> on 02-01-2021; <https://www.wisegeek.com/what-are-hormones.htm> on 02-01-2021). Because of their essential role in the body, even slight hormonal imbalances can cause side effects throughout the body (<https://www.physio-pedia.com/Hormones> on 02-01-2021).

The aim of the study is to evaluate the findings of the selected articles and to provide the comprehensive review regarding the effect of yoga on hormonal functions. The present meta-analysis elaborates the effect of yoga on hormonal functions in regards to cortisol levels, melatonin levels, serotonin levels, follicle stimulating hormone, luteinizing hormone, testosterone and testosterone to cortisol ratio. Most of the studies have used the combination of asanas, pranayamas and meditation or either of them as the treatment protocol. Moreover, it provides data in regards to statistics of male and female sample size, age of sample, duration of treatment protocol which can be useful for further investigation.

MATERIALS AND METHODS

Procedure: In order to perform a meta-analysis on the effect of yoga practices on hormonal functions the studies were collected from online databases such as Science Direct, PubMed, Wiley Online Library and Google Scholar. The articles published from 2000 to 2020 were considered. The main keywords were "yoga," "hormones" and "athletes". The studies were excluded on the basis of following criteria: (1) thesis and dissertation, short communications, encyclopedia, discussions, editorials, personal account, review articles, conference abstracts, posters, book chapters were not included, (2) studies on unhealthy individuals were excluded (3) studies without full text availability were not included.

Table 1. Summary of the Studies Depicting the Effect of Yoga Practice on Hormonal Functions

S.No.	Study	Sample Size and Gender	Age (in years)	Intervention	Treatment Protocol (Acute/ Chronic)	Result
1.	Martarelli, et. al., (2011)	16 (M)	44.4 ± 2	DB (pranayamas)	1 hour	<ul style="list-style-type: none"> •↑ antioxidant defense status •↓ in cortisol &↑ in melatonin level •↓ oxidative stress
2.	Chaturvedi, et. al.,(2016)	216(F)	40 to 60	Asanas Pranayamas	12 weeks	<ul style="list-style-type: none"> •↓ FBS & GHB •↑ Cortisol levels in CG& maintained in EG •↑ total plasma thiols level in CG
3.	Pooja, et. al., (2016)	40 (M & F)	18 to 25	Yogasanas Pranayamas Meditation	3 months	<ul style="list-style-type: none"> •↓ Salivary cortisol
4.	Papp, et. al., (2016)	6(M) 38(F)	20 to 39	High intensity hatha yoga	6 weeks	<ul style="list-style-type: none"> •↑ ApoA1 & adiponectin levels in HIY group
5.	Karimi et.al., (2016)	24(M)	21.7 ± 2.3 years	Asanas Pranayamas	8 weeks	<ul style="list-style-type: none"> •↑ serotonin levels & mood disturbance scores
6.	Furtado, et. al., (2016)	35(F)	83.81 ± 6.6	Hatha yoga asanas	14 weeks	<ul style="list-style-type: none"> •↑ Salivary cortisol &↓ salivary alpha amylase (sAA) in CG
7.	Jorge, et. al., (2016)	88(F)	45 to 65	Asanas Pranayamas Stretching exercises	12 week	<ul style="list-style-type: none"> •↓ scores for menopausal symptoms, stress levels & depression symptoms in yoga group •↑ quality of life in yoga group •↑ cortisol in CG •↓ FSH* and LH* in yoga & exercise group
8.	Eda, et. al., (2017)	23 (F)	60.4 ± 10.4	Leg massage and acupressure Yoga poses-the warrior, extended triangle, downward facing dog poses and corpse pose	90 min	<ul style="list-style-type: none"> •↑ Salivary SIgA* concentration and secretion rate, testosterone secretion rate and T/C ratio* •↓ Cortisol concentration and secretion rate
9.	Vinu, W., (2018)	45(M)	18 to 25	Yoga training Swiss ball training	10 weeks	<ul style="list-style-type: none"> •↑ T3 in yoga group
10.	Eda, et. al.,(2020)	10(M)	26.3 ± 2.5	Leg massage and acupressure Yoga poses-the warrior, extended triangle, downward facing dog poses and corpse pose	90 min	<ul style="list-style-type: none"> •↑ Salivary testosterone level & Testosterone/ cortisol ratio •↓ Cortisol level

*FBS- fasting blood sugar, GHB-Glycated Haemoglobin, CG- control group, EG- experimental group, APoA1- apolipoprotein A1,FSH- follicle stimulating hormone, LH- luteinizing hormone, SIgA- Secretory immunoglobulin A, T/C ratio- testosterone to cortisol ratio, T3-triiodothyronine

Table 2. Statistics of Yoga Intervention (Hormonal Variables)

S.No.	Intervention	Frequency (f)	Percentage (%)	Ranking
1	Asanas	9	60	1
2	Pranayama	5	33.33	2
3	Meditation	1	6.67	3

Note:Asanas included various yoga poses, pranayama included breathing practices, meditation included various relaxation techniques and bandha practice included various bandha asanas mentioned in Patanjali Yoga sutra.

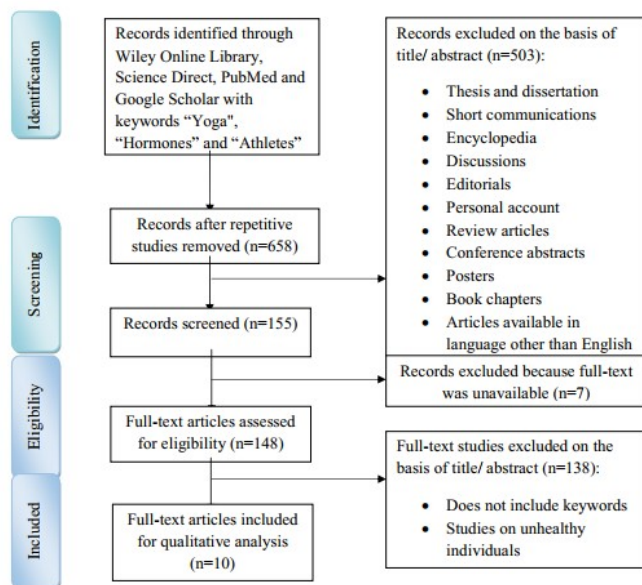


Figure 1. Flow Chart Depicting the Selection of Studies for Meta-analysis on Effect of Yoga on Hormonal Functions

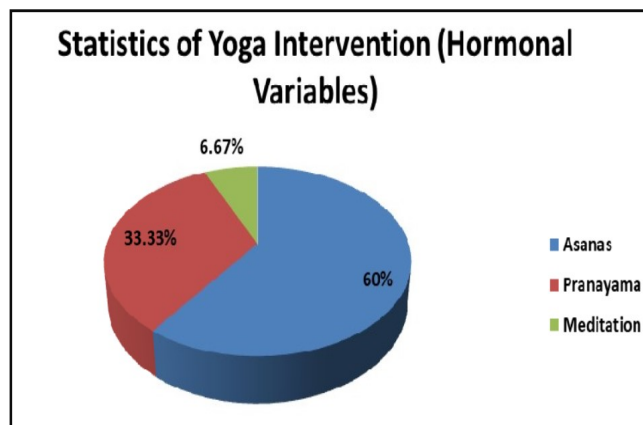


Figure 2. Statistics of Yoga Intervention in Regard to Hormonal Variables

The total studies, identified were N=5866 and the studies included for critical analysis were N=10. The procedure of studies included in the meta-analysis is shown with the help of following flowchart:

Statistical Analysis: The data was analyzed using the statistics namely mean, frequency, percentage (%) and ranking for furthering the meta-analysis in regards to sample size, gender, age, intervention and treatment protocol (Acute/Chronic).

RESULTS

The summary of the studies depicting the effect of yoga practices on hormonal functions have been provided in table 1. The findings of the meta-analysis have also been documented in the table 1 and illustrated using figure 2. According to table 1, the total number of male and female subjects studied across all the selected critical literature (N=10) was 101 and 400 respectively. The minimum sample size for male and female was 6 and 23 respectively. Whereas the maximum sample size for male and female were 45 and 216 respectively. The average sample size for male and female was 11.22 and 80 respectively. According to table 1, the minimum duration of treatment protocol for acute and chronic across all the selected critical literature (N=30) was 60 minutes and 42 days respectively. The maximum duration of treatment protocol for acute and chronic was 90 minutes and 98 days respectively. Whereas, the average duration of treatment protocol for acute and chronic was 80 minutes and 74.85 days

respectively. According to table 1, Minimum of minimum age of the subjects is 18 years and minimum of maximum age of the subjects is 25 years. The maximum of minimum age of the subjects is 45 years and maximum of maximum age is 65 years. The average of minimum age of the subjects is 28.2 years and average of maximum age is 42.8 years. According to table 2, asanas were ranked 1 followed by pranayama, meditation. The findings have been illustrated in the figure 2.

DISCUSSION

Yoga practices improve hormonal function as proved by many studies conducted. Diaphragmatic breathing could protect athletes from long term adverse effects of free radicals as it increases antioxidant defence status and melatonin level in athletes, decreases the cortisol and lowers the level of oxidative stress (Martarelli, 2011) Yoga exercise helps in maintaining sugar levels and calming effects of yoga practice is important in relieving stress and enhancing health in perimenopausal women (Chaturvedi, 2016) It also helps in regulating salivary cortisol level and blood lipids (Eda, 2017; Eda, 2020; Pandey *et al.*, 2016; Papp, 2016) Yoga training significantly increases serotonin levels and decreases mood disturbance which leads to prevention of overtraining syndrome (Karimi, 2015). Hatha yoga asanas is able to maintain physical fitness scores and stress hormone levels (Furtado *et al.*, 2016) Yoga group shows lower scores for menopausal symptoms and decreasing levels of follicle stimulating hormone and Luteizing hormone (Jorge, 2016) Yoga stretching reduces stress and enhances mucosal immune function in elderly women (Eda, 2017) Yogic training group have increasing level of triiodothyronine (T3) (Vinu, 2018).

CONCLUSION

The present study provides ample evidence to prove that yoga treatment decreases or maintains the cortisol level and increases melatonin level, testosterone level and testosterone/cortisol ratio. The findings of the aforementioned studies examining the effect of yoga on hormonal function does not provide concrete conclusion due to variation in study designs, difference in duration of protocol, difference in population size, age and gender and difference in the specific yoga program. Although, the results positively demonstrate that yoga practices in any form such as asanas, pranayamas and meditation are beneficial for hormonal functions. Finally, it is concluded that regular yoga practices surely improves hormonal functions.

REFERENCES

- As retrieved from <https://www.mea.gov.in/in-focus-article.htm?25096/Yoga+Its+Origin+History+and+Development#:~:text=Introduction%20%3AYoga%20is%20essentially%20a,%20or%20to%20unite on 02-01-2021>
- As retrieved from <https://timesofindia.indiatimes.com/blogs/toi-edit-page/yoga-for-everyone-indias-gift-to-the-world-for-healthy-living-has-now-been-widely-adopted/ on 02-01-2021>
- Woodyard C. (2011). Exploring the therapeutic effects of yoga and its ability to increase quality of life. *International journal of yoga*, 4(2), 49–54.
- Sharma, M.; Haider,T. (2013). Yoga as an Alternative and Complementary Therapy for Patients Suffering from Anxiety: A Systematic Review. *Journal of Evidence-Based Complementary & Alternative Medicine*, 18(1), 15-22.
- Martarelli, D., Cocchioni, M., Scuri, S., & Pompei, P. (2011). Diaphragmatic Breathing Reduces Exercise-Induced Oxidative Stress. *Evidence-Based Complementary and Alternative Medicine*, 2011.
- Chaturvedi, A., Nayak, G., Nayak, A., & Rao, A. (2016). Comparative Assessment of the Effects of Hatha Yoga and Physical Exercise on Biochemical Functions in Perimenopausal Women. *Journal of Clinical and Diagnostic Research*, 10(8), KCO1-KCO4.

- Eda, N., Ito, H., Shimizu, K., Suzuki, S., Lee, E., & Akama, T. (2017). Yoga Stretching for Improving Salivary Immune Function and Mental Stress in Middle-Aged and Older 99 Adults. *Journal of Women and Aging*, 30(3), 227–241.
- Eda, N., Ito, H., & Akama, T. (2020). Beneficial Effects of Yoga Stretching on Salivary Stress Hormones and Parasympathetic Nerve Activity. *Journal of Sports Science & Medicine*, 19(4), 695–702.
- Karimi, M., & Noori, A.Y. (2015). Serotonin and Mood State Changes in Response to a Period of Yoga Training in Well-Trained Wrestlers. *International Journal of Wrestling Science* 5 (2), 89–92.
- As retrieved from <https://medical-dictionary.thefreedictionary.com/Hormone> on 02-01-2021
- As retrieved from <https://www.wisegeek.com/what-are-hormones.htm> on 02-01-2021
- As retrieved from <https://www.physio-pedia.com/Hormones> on 02-01-2021
- Pandey, P., Singh, V., Devesh, D., & Haider, J. (2016). Effect of Yoga on Salivary Cortisol in Medical Student. *International Journal of Research in Medical Sciences*, 4(11), 4995–4998.
- Papp, M. E., Lindfors, P., Nygren-Bonnier, M., Gullstrand, L., & Wändell, P. E. (2016). Effects of High-Intensity Hatha Yoga on Cardiovascular Fitness, Adipocytokines, and Apolipoproteins in Healthy Students: A Randomized Controlled Study. *Journal of Alternative and Complementary Medicine (New York, N.Y.)*, 22(1), 81–87.
- Karimi, M., & Noori, A.Y. (2015). Serotonin and Mood State Changes in Response to a Period of Yoga Training in Well-Trained Wrestlers. *International Journal of Wrestling Science* 5 (2), 89–92.
- Furtado, G. E., Uba-Chupel, M., Carvalho, H. M., Souza, N. R., Ferreira, J. P., & Teixeira, A. M. (2016). Effects of a Chair-Yoga Exercises on Stress Hormone Levels, Daily Life Activities, Falls and Physical Fitness in Institutionalized Older Adults. *Complementary Therapies in Clinical Practice*. 24. 123–129. <https://doi.org/10.1016/j.ctcp.2016.05.012>
- Jorge, M. P., Santaella, D. F., Pontes, I. M. O., Shiramizu, V. K. M., Nascimento, E. B., Cabral, A., Lemos, T. M. A. M., Silva, R. H., & Ribeiro, A. M. (2016). Hatha Yoga Practice Decreases Menopause Symptoms and Improves Quality of Life: A Randomized Controlled Trial. *Complementary Therapies in Medicine*, 26, 128–135. <https://doi.org/10.1016/j.ctim.2016.03.014>
- Vinu, W. (2018). Implication of Yogic Practices and Swiss Ball Training on Hormone Triiodothyronine (T3) in Physical Education Students. *International Journal of Academic Research and Development*, 3(2), 1711-1713
