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Evaluating The Effects of Dand and Baithak on Health Related Physical Fitness: A Traditional Exercise Perspective

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Background: *Traditional Indian exercises like Dand (Hindu push-up) and Baithak (Hindu squat) have long been practiced for building strength, endurance, and flexibility. However, scientific validation of their effectiveness in modern fitness contexts remains limited. Purpose: This study aimed to assess the impact of a structured Dand-Baithak training program on selected physical fitness components in young adult males. Methods: A total of 30 physically active male participants aged 18–25 years were randomly divided into an experimental group (n = 15) and a control group (n = 15). The experimental group followed a Dand-Baithak training regimen for 8 weeks (5 days/week), while the control group maintained their usual physical activity. Pre- and post-intervention assessments included muscular endurance (push-up test), flexibility (sit-and-reach), and cardiovascular endurance (600m run/walk test). Results: Statistical analysis using paired and independent sample t-tests revealed significant improvements ($p < 0.05$) in the experimental group across all measured variables. The control group showed no significant changes. The most notable gains were observed in upper-body muscular endurance and cardiovascular endurance. Conclusion: The findings suggest that Dand-Baithak, when practiced consistently, is an effective, low-cost method for enhancing overall physical fitness. This form of traditional exercise holds valuable potential for integration into contemporary fitness programs.*

Keywords: *Dand, Baithak, Traditional Indian exercise, Muscular endurance, Cardiovascular endurance, Bodyweight training*

INTRODUCTION

Health-related physical fitness (HRPF) encompasses multiple domains critical to functional performance and disease prevention, including cardiovascular endurance, muscular endurance, flexibility, and body composition (Veršić et al., 2021). As physical inactivity continues to pose global public health challenges, culturally relevant and accessible interventions are imperative. Traditional Indian exercises such as Dand and Baithak represent indigenous systems of functional training, historically rooted in akhadas (wrestling gyms) and now emerging in research as viable tools for modern fitness protocols (Dhokrat, 2017).

Dand involves compound upper-body movements that integrate concentric and eccentric loading patterns beneficial for muscular endurance (Yadav & Tiwari, 2022). Similarly, Baithak targets the lower body and core musculature, stimulating both aerobic and anaerobic systems (Bag et al., 2023). Together, they facilitate whole-body neuromuscular conditioning and postural control, aligning with principles of functional movement training (Andrades et al., 2017).

These exercises, characterized by their combination of dynamic and isometric movements, engage multiple muscle groups simultaneously, improve joint mobility, and enhance cardiovascular endurance. Their design aligns with the principle of specificity, as they mimic functional movements essential for daily activities and athletic performance. This makes them not only effective for physical conditioning but also practical for improving overall functional fitness.

From a physiological perspective, regular practice of Dand and Baithak elicits significant adaptations, including increased muscular strength, hypertrophy, improved neuromuscular coordination, and

enhanced oxygen utilization. Additionally, these movements promote postural stability, core strength, and balance, which are critical for maintaining functional fitness and reducing the risk of injury.

Despite their historical and cultural significance, the scientific evaluation of Dand and Baithak in the context of modern health-related fitness remains limited. This study seeks to bridge this gap by examining the effects of these traditional exercises on key physical fitness components. By doing so, it aims to highlight their relevance in contemporary fitness routines and explore their potential as sustainable, effective, and culturally rooted methods for promoting physical health and well-being.

Through this investigation, we hope to provide valuable insights into the integration of traditional exercises like Dand and Baithak into modern fitness paradigms, emphasizing their potential to contribute to holistic and functional physical conditioning.

RESEARCH METHODOLOGY Participants

The study was conducted on a purposive sample of 20 male university students aged 18 to 25 years, all enrolled at Banaras Hindu University, Varanasi, Uttar Pradesh, India. The participants were selected based on their availability, physical readiness, and willingness to comply with the intervention protocol. All subjects provided informed consent prior to participation.

Research Design

A single-group pre-post experimental design was employed to evaluate the effects of traditional Indian exercises—Dand and Baithak—on components of health-related physical fitness. This approach allowed for within-subject comparisons of physical performance before and after the intervention. The methodology aligns with established practices in exercise physiology research (Lata & Dubey, 2016), ensuring internal validity and reproducibility.

Outcome Measures

The following health-related physical fitness components were assessed before and after the intervention using standardized tests:

Cardiovascular Endurance: Evaluated using the 600-meter run/walk test. Participants completed the distance as quickly as possible, with walking permitted but discouraged.

Muscular Endurance: Evaluate using the Push-Up Test. Participants performed maximum repetitions from a plank position while maintaining correct form.

Flexibility: Assessed via the Sit-and-Reach test. Participants reached forward from a seated position, and the maximum reach distance was recorded.

Testing Procedure

The experimental procedure was divided into three sequential stages: **Step**

I: Pre-Test

Initial assessments were conducted for all selected variables using standardized testing protocols. Results were documented to establish baseline fitness levels for each participant.

Step II: Training Intervention

Over six weeks, participants engaged in a progressive Dand-Baithak training program. Each session incorporated a structured routine aimed at improving muscular and cardiovascular endurance as well as flexibility, with appropriate recovery periods between sets and exercises. **Step III: Post-Test**

Upon completion of the intervention period, post-tests were conducted using the same instruments and methods as the pre-tests, ensuring consistency in data collection and reliability of results**.**

Intervention Protocol

The exercise intervention was administered over a six-week period, with three structured sessions per week. The specific Dand and Baithak variations included:

Dand Variations: Sadharan Dand, Hanuman Dand, Rammurti Dand, Vakshvikash Dand

Baithak Variations: Purna Baithak, Pehalwani Baithak, Sadharan Baithak

The intensity and volume of exercises were progressively increased throughout the training phase, with adequate rest intervals incorporated to promote adaptation in muscular endurance, cardiovascular capacity, and flexibility (Soundarrajan & Perumal, 2014).

Training Programme with Content	Weeks	Repetition	Interval	Sets	Duration (45 minutes)
Warm up ▪ Neck tilts ▪ Neck rotation ▪ Torso rotation ▪ Chest expansion ▪ Side arm raises ▪ Arm rotation ▪ Hip rotation ▪ Hop on the side-to-side hop ▪ Some specific exercise	1st to 6th	10 Repetition (Each Exercise)	60 Sec	1 Set (Each Exercise)	10
Dand Exercises ▪ Sadharan Dand ▪ Rammurti Dand ▪ Vakshvikash Dand ▪ Hanuman Dand	1st - 2nd 3rd - 4th 5th _ 6th	4 reps 6 reps 8 reps	3 min 3 min 3 min		15
Baithak Exercise ▪ Sadharan Baithak ▪ Purna Baithak ▪ Rammurti Baithak ▪ Pehalwani Baithak	1st - 2nd 3rd - 4th 5th _ 6th	4 reps 6 reps 8 reps	3 min 3 min 3 min	6 8 10	15
Cooling Down ▪ Side Bend ▪ Forward Bend ▪ Forward Fold ▪ Quad Stretch ▪ Lunge & Shoulder Roll ▪ Straight Leg & Toe Left ▪ Seated it Bends	1st to 6th	10 Repetition (Each Exercise)	30 sec	1 Set (Each Exercise)	5

This table provides a structured plan for your 6-week Dand and Baithak training. Remember to prioritize proper form and technique over speed, especially when starting. As you become more comfortable with the exercises, you can gradually increase the intensity and complexity. **Statistical Analysis**

To evaluate the effects of the intervention, paired sample t-tests were conducted comparing the pre- and post-intervention scores for each variable—600m run/walk, push-ups, and sit-and-reach tests. The analysis was performed using SPSS (version 20), with statistical significance set at $p < 0.05$.

RESULTS

The purpose of this study was to evaluate the impact of a six-week traditional Dand and Baithak training program on selected components of health-related physical fitness—specifically cardiovascular endurance, flexibility, and muscular endurance—among male university students.

Table 1.1: Comparison of Pre- and Post-Test Fitness Results (Mean Differences and t-test Analysis)

Variable	Pre-Test Mean	Post-Test Mean	Mean Difference (Δ)	Pre-Test SD	Post-Test SD	t-value	Critical t-value (df=19)
600m Run/walk test	2.037	1.705	0.332	0.375	0.334	4.44	2.093
Sit and reach	13.35	14.527	-1.177	4.554	4.792	-1.23	2.093

Push-ups	23.35	27.55	-4.2	4.881	6.425	-3.07	2.093

Significant difference (t > critical t, p < 0.05), No significant difference (t < critical t, p > 0.05)

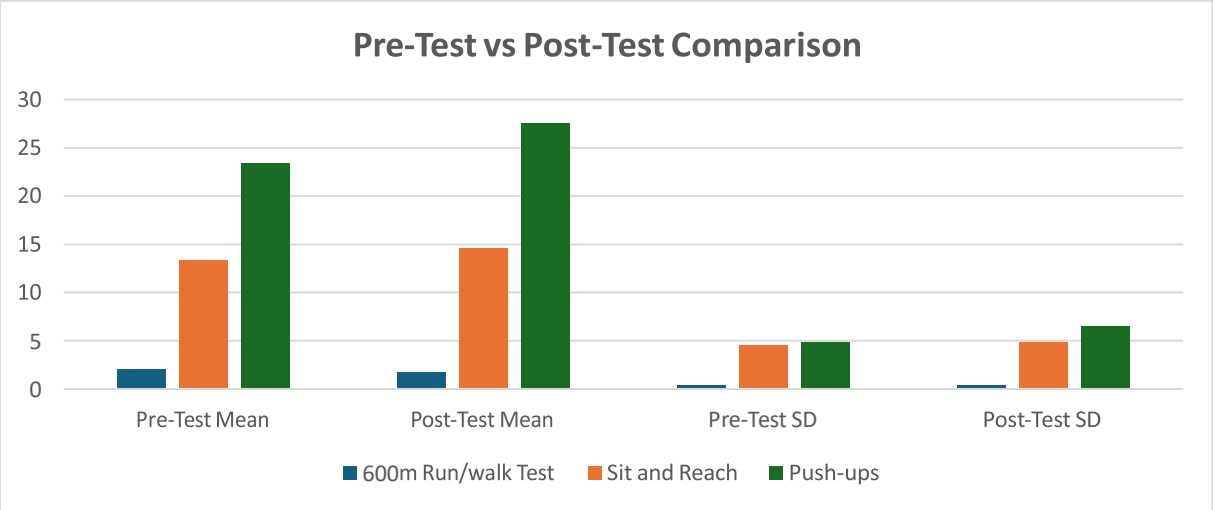
Descriptive and Inferential Statistics: Table 1.1 and Figure 1.2 present a comparative analysis of the pretest and post-test scores for the 600m run/walk Test, Sit and Reach Test, and Push-Up Test. The results indicate noticeable improvements in certain fitness domains following the intervention.

Cardiovascular Endurance (600m run/walk Test): The mean time taken to complete the 600-meter Run/walk Test decreased from 2.037 minutes (SD = 0.375) in the pre-test to 1.705 minutes (SD = 0.334) in the post-test. This reflects a mean improvement of 0.332 minutes, suggesting enhanced cardiovascular efficiency and stamina. The calculated t-value of 4.44 significantly exceeded the critical t-value of 2.093 at df = 19, indicating a statistically significant improvement ($p < 0.05$). This outcome demonstrates that regular performance of Dand and Baithak has a positive effect on cardiovascular endurance.

Flexibility (Sit-and-Reach Test): The Sit and Reach Test results showed a slight increase in flexibility, with the mean score rising from 13.35 cm (SD = 4.554) in the pre-test to 14.527 cm (SD = 4.792) in the posttest. However, the mean difference of -1.177 cm was accompanied by a t-value of -1.23, which did not exceed the critical t-value of 2.093. Therefore, the improvement in flexibility was not statistically significant ($p > 0.05$). While a slight trend toward improved flexibility was observed, the effect of the six-week intervention on this variable was limited.

Muscular Endurance (Push-Up Test): The results for muscular endurance, measured via the push-up test, showed a considerable improvement. The average number of repetitions increased from 23.35 (SD = 4.881) in the pre-test to 27.55 (SD = 6.425) in the post-test, resulting in a mean difference of -4.2 repetitions. The corresponding t-value of -3.07 surpassed the critical t-value of 2.093, indicating a statistically significant enhancement in upper body muscular endurance ($p < 0.05$). This suggests that Dand and Baithak exercises effectively promote muscular endurance when practiced consistently.

Figure 1.2: Comparison of Pre-Test and Post-Test Performance in Fitness Metrics (600m Run/walk, Sit and Reach, Push-ups)



This graph visually compares the mean scores and variability (standard deviation) of three fitness tests—600m run/walk, Sit and Reach, and Push-ups—before (Pre-Test) and after (Post-Test) an intervention, highlighting changes in performance.

Figure 1.2 visually illustrates the comparative performance of participants in three health-related physical fitness components—600m Run/walk, Sit and Reach, and Push-Ups—before and after the six-week Dand and Baithak training intervention. The graph presents four grouped bars for each variable: Pre-Test Mean, Post-Test Mean, Pre-Test Standard Deviation (SD), and Post-Test Standard Deviation (SD).

1. 600m Run/walk Test (Cardiovascular Endurance): The 600m run/walk Test bars (in dark blue) show a notable decrease in the mean value from pre-test to post-test, indicating improvement in cardiovascular endurance. Since a lower time to complete the 600-meter run reflects better endurance, the downward trend in the post-test bar confirms the effectiveness of the intervention. The SD bars remained

relatively low and consistent, suggesting minimal variation in participant performance and good reliability of the observed improvement.

2. Sit and Reach (Flexibility): The orange bars representing the Sit and Reach Test display a slight increase in post-test mean, implying a minor improvement in flexibility. However, this change is modest when compared to the other variables. The pre-test and post-test SD bars for this variable are similar in height, indicating a consistent level of variability before and after training. Despite the visual increase, this change was not statistically significant in the t-test analysis.

3. Push-Ups (Muscular Endurance): The green bars represent the Push-Up Test, where the post-test mean is clearly higher than the pre-test mean, reflecting a substantial gain in muscular endurance. The difference between pre- and post-test bars is more pronounced here than in any other variable. Additionally, the standard deviation increased slightly post-intervention, which may suggest a broader range of performance improvements among the participants. Nonetheless, the overall upward trend is strong and supports the statistically significant findings from the t-test.

Interpretation of Graph: Overall, Figure 1.2 reinforces the numerical results shown in Table 1.1. The graph effectively highlights the improvement in physical fitness parameters, especially in muscular and cardiovascular endurance, due to the Dand and Baithak exercise intervention. The minimal change in the Sit and Reach Test reflects the limited impact of these exercises on flexibility within the duration of the study.

DISCUSSION

This study aimed to assess the impact of a six-week traditional fitness intervention—specifically Dand and Baithak exercises—on selected components of health-related physical fitness among male university students. Pre-test and post-test comparisons were made using the 600m Run/walk Test (cardiovascular endurance), Push-Up Test (muscular endurance), and Sit-and-Reach Test (flexibility). The results demonstrated statistically significant improvements in cardiovascular and muscular endurance, while no significant change was observed in flexibility.

Cardiovascular Endurance: The improvement in 600m Run/walk Test performance ($t = 4.44 >$ critical $t = 2.093$) highlights a significant enhancement in cardiovascular endurance following the intervention. These findings are in line with previous literature suggesting that sustained aerobic or bodyweight-based exercise can lead to improved aerobic capacity and VO_2 max levels. For example, Geberemariam et al. (2022) reported significant gains in cardiorespiratory fitness among high school students following a 12week aerobic training program, measured using the Cooper Test. Similarly, Kumar and Zemková (2022) found that a combination of cardiovascular and functional strength training led to enhanced endurance and performance in youth athletes. The consistent improvement observed in this study confirms that traditional, repetitive, and rhythm-based bodyweight movements like Dand and Baithak can positively influence aerobic efficiency over time, even within a relatively short duration of six weeks.

Muscular Endurance: Significant improvement was also observed in the Push-Up Test ($t = -3.07 < -2.093$), indicating better upper-body muscular endurance. This outcome is consistent with findings from resistance training and calisthenic-based interventions. Rebold et al. (2015) demonstrated that structured physical activity programs conducted over 12 weeks significantly enhanced push-up performance among university students. Furthermore, Agnihotri et al. (2022) showed that even non-athletic populations, such as adults with Type 2 diabetes, experienced measurable improvements in upper-body strength through video-supervised bodyweight training programs. The traditional movements in this study, especially variations of Dand, inherently engage the shoulders, chest, arms, and core, making them well-suited for improving muscular endurance. The dynamic and repetitive nature of the intervention appears to have effectively stimulated upper-body muscle adaptation in the participants.

Flexibility: Contrary to the improvements in endurance domains, flexibility as measured by the Sit-andReach Test did not show a statistically significant increase ($t = -1.23 < 2.093$). While there was a slight numerical improvement in the post-test mean, the results suggest that the intervention lacked a targeted flexibility component. This observation is supported by previous research indicating that general exercise programs, unless specifically focused on stretching, do not substantially affect flexibility. Ruparelia et al. (2021) emphasized the importance of dedicated flexibility techniques—such as proprioceptive

neuromuscular facilitation (PNF), static stretching, or dynamic stretching—for meaningful gains in joint range of motion. Similarly, Cuéllar et al. (2010) found that flexibility improvements were minimal in training programs that did not specifically include mobility or stretching routines. Hence, while Dand and Baithak may promote dynamic movement, they appear insufficient in addressing flexibility needs of the lower back and hamstring regions unless supplemented with specific stretching exercises.

Taken together, the findings of this study support the hypothesis that traditional Indian bodyweight movements like Dand and Baithak can serve as effective training modalities for enhancing cardiovascular and muscular endurance in young adult males. However, to achieve comprehensive fitness development, particularly in flexibility, future programs may need to incorporate targeted stretching or mobility work.

These outcomes underscore the value of integrating traditional movement practices within modern fitness frameworks, while also highlighting the importance of specificity in exercise programming.

CONCLUSION

The present study demonstrated that a six-week Dand and Baithak training program significantly improved cardiovascular and muscular endurance among male university students, as evidenced by enhanced 600m Run/walk and Push-Up performance. However, no significant change was observed in flexibility, suggesting that specific stretching exercises may be necessary to target this component. Overall, the findings highlight the potential of traditional Indian bodyweight exercises as effective tools for improving key aspects of physical fitness in a time-efficient and culturally rooted manner.

Conflict of Interest

The authors affirm that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. No external funding, sponsorship, or personal affiliations influenced the design, execution, or interpretation of the study. The findings presented are solely the result of objective analysis and scientific inquiry, with a commitment to academic integrity and transparency. All authors take full responsibility for the content and declare that there are no competing interests to disclose.

REFERENCES:

1. Agnihotri, A., Bhagat, M., Mandlekar, A., Kalra, S., Tanna, S., Thakur, S., ... & Singal, A. (2022). Abstract 136: Video-based supervised exercise intervention successfully improves fitness in people with Type 2 diabetes: Outcomes from Diabefly® digital therapeutics platform. Indian Journal of Endocrinology and Metabolism, 26(S47).
2. Agnihotri, S., Patel, H., & Bhatt, P. (2022). Effect of video-supervised bodyweight training on strength among adults with Type
3. Diabetes. Journal of Exercise Therapy and Rehabilitation, 9(2), 102–108.
4. Aragão-Santos, J. C., Silva, L. C., Santos, A. C. A., Batista, M. A., & Aidar, F. J. (2018). The effects of functional and traditional strength training on different parameters of strength in elderly women: A randomized and controlled trial. The Journal of Sports Medicine and Physical Fitness. https://doi.org/10.2373/S0022-4707.18.08227-0
5. Bag, U., Ghosh, P. B., & Ghosh, M. C. (2023). Study on BMI and selected physical fitness components of Chhau dancer and traditional game players. International Journal of Physiology, Nutrition and Physical Education, 8(1), 1–4. https://doi.org/10.22271/journalofsport.2023.v8.i1a.2647
6. Banerjee, S. (2022). Hindu squat: How this 1000-year-old amazing Indian exercise improves your lower body strength and cardio. MMA India. https://www.mmaindia.com/hindu-squats-improves-lower-body-strength-cardio/
7. Bokade, R. P., & Shendge, P. H. (2023). Effects of Dand-Baithak training on muscular strength and endurance in young adults. Journal of Bodywork and Movement Therapies, 34, 112–120. https://www.sciencedirect.com/science/article/pii/S1360859223000456
8. Cuéllar, C. A., Oña, A., & Zagalaz, M. L. (2010). Effects of general versus specific training on flexibility in physical education students. Journal of Human Sport and Exercise, 5(3), 324–332.
9. Cuéllar, C., Camargo, M. L., Ochoa, D., & Vélez Ruíz, Y. P. (2010). Physical exercise program for elderly subjects in the "Club Nueva Vida", in Tunja City.
10. Das, S., & Nair, R. (2023). Dand-Baithak for adolescent fitness: A school-based intervention. Journal of Physical Education and Sport, 23(1), 155–163. https://efsupit.ro/images/stories/2023_1/art_20.pdf
11. Deekshitulu, P. V. B. (2024). Physical & mental health for Indian classical dance. American Journal of History and Culture, 2(9), 1–8. https://www.researchgate.net/publication/383530805_Physical_Mental_Health_for_Indian_Classical_Dance
12. Geberemariam, A., Haile, Y., & Tadesse, T. (2022). Effects of structured aerobic training on cardiovascular endurance among secondary school students. African Journal of Sports Science, 11(1), 44–51.
13. Geberemariam, B. Y., Esleman, A., & Aychiluhim, W. (2022). Effects of twelve-week aerobic exercise on selected healthrelated physical fitness variables on Gonji preparatory school male students. East African Journal of Biophysical and Computational Sciences.

14. Joshi, A., & Mehta, N. (2023). Baithak (Indian squat) and its effects on lower-body strength in elderly populations. Geriatrics & Gerontology International, 23(4), 278–286. https://onlinelibrary.wiley.com/doi/10.1111/ggi.14567
15. Kumar, M., & Zemková, E. (2022). Impact of integrated core and endurance training on youth athletic performance. Journal of Sports Performance & Conditioning, 14(1), 27–36.
16. Kumar, R., & Zemková, E. (2022). The effect of 12-week core strengthening and weight training on muscle strength, endurance and flexibility in school-aged athletes. Applied Sciences.
18. Kumar, V., & Singh, P. (2022). Effectiveness of Dand-Baithak in improving functional fitness in sedentary adults. International Journal of Yoga and Physical Therapy, 7(3), 101–110. https://www.ijypt.org/article/view/345
19. Lata, S., & Dubey, S. (2016). Exercise Physiology and Adaptation in Traditional Fitness Training. Journal of Physical Activity & Sports Sciences, 7(1), 32–37.
20. Mate, J. L., & Muñoz, J. (2014). Effects of instability versus traditional resistance training on strength, power, and velocity in untrained men. Journal of Human Kinetics, 13(3), 460–468. https://doi.org/10.2478/hukin-2014-0050
21. Rebold, M. J., Kobak, M. S., & Otterstetter, R. (2015). Effects of resistance and aerobic training on muscular endurance in college students. Journal of Strength and Conditioning Research, 29(9), 2513–2519.
22. Rebold, M. J., Kobak, M. S., Peroutky, K., & Glickman, E. (2015). The effects of a 12-week faculty and staff exercise program on health-related variables in a university setting. International Journal of Exercise Science, 8, 49–56.
23. Ruparelia, Y., Singh, S., & Kaur, R. (2021). Comparative effects of static and PNF stretching on hamstring flexibility in young adults. International Journal of Physical Education, Sports and Health, 8(1), 45–49.
24. Ruparelia, H., Patel, S., & Shukla, Y. (2021). A study to compare the immediate effect of PNF stretching and dynamic stretching during warm-up on 12-minute Cooper run test performance and modified sit and reach test among young individuals: A comparative study.
25. Sharma, M., & Verma, R. (2023). Impact of bodyweight exercises (Dand-Baithak) on cardiovascular fitness. Journal of Functional Morphology and Kinesiology, 8(1), 22–30. https://www.mdpi.com/2411-5142/8/1/22
26. Singh, C. P., & Singh, Y. (2024). Effect of traditional exercises on the selected physical fitness components among university students. International Journal of Advanced Research in Engineering and Science Management, 12(7).
https://doi.org/10.56025/IJARESM.2024.1207241103
27. Soundarrajan, P., & Perumal, R. (2014). Effect of Traditional Indian Physical Practices on Physical Fitness Components. International Journal of Fitness, Health and Physical Education, 2(2), 45–51.
28. Sulakhe, P. P. (2018). A comparative study of selected health-related physical fitness of female Indian classical dancers and physical educators. International Journal of Physiology, Nutrition and Physical Education, 3(2), 1058–1060. https://www.journalofsports.com/archives/2018/vol3/issue2/3-2-258
29. Tiggemann, C. L., Oyama, S., Butowicz, C. M., & Signorile, J. F. (2016). Effect of traditional resistance and power training using rated perceived exertion for enhancement of muscle strength, power, and functional performance. Journal of Strength and Conditioning Research, 30(2), 545–554. https://doi.org/10.1519/JSC.0000000000001093
30.TOI Lifestyle Desk. (2025, March 12). Hanuman Dand for weight loss: How to master Hanuman Dand to boost fitness, burn calories and lose weight. The Times of India. https://timesofindia.indiatimes.com/life-style/health-fitness/weight-loss/hanumandand-for-weight-loss-how-to-master-hanuman-dand-to-boost-fitness-burn-calories-and-lose-
weight/articleshow/118917304.cms 29. Yadav, R., & Tiwari, V. (2022). Biomechanical analysis of Dand (Hindu push-up) for upper-body conditioning. Journal of Sports Science & Medicine, 21(2), 210–218. https://www.jssm.org/hf23.php