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A clinical study to evaluate the effectiveness of *Agni-Karma* in the management of direct inguinal hernia

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Abstract

Hernia, the protrusion of an organ or part through its containing wall, is a prevalent condition, with direct inguinal hernia (DIH) being the most common abdominal hernia among males. Inguinal hernia repair constitutes a significant proportion of surgical procedures globally and is associated with notable morbidity and mortality rates. In Ayurveda, DIH is classified as *Anthra Vriddhi* in *Vriddhi Adhyaya*, aligning closely with modern descriptions of inguinal hernia. *Sushrutha Acharya* (SA) recommends *Agni Karma* for this condition, as it is considered incurable (*Asadhya*) and necessitates surgical intervention, particularly for hernias that have not yet distended to the scrotum (*Apraptha palakosha*). Thus, the objective of this study is to evaluate the effectiveness of *Agni Karma* in managing direct inguinal hernia compared to *Lashuna Eranda* Oil *Pichu Dharana*. A total of 60 patients, aged 45-75 years, with clinically diagnosed DIH were randomly divided into two groups: Trial (*Agni Karma*) and control (*Lashuna-Eranda Pichu Dharana)*. The study spanned 30 days, during which the trial group received *Agni Karma* with *Pancha Lauha Shalaka*, and control group underwent *Pichu Dharana* with *Lashuna Eranda* Oil on specific days. Subjective and objective criteria, including pain, movement limitation, reducibility, and hernia lump size, were used to assess treatment effectiveness. SPSS statistical software was employed for data evaluation. Both treatment groups showed significant relief in signs and symptoms post-treatment ($p<0.05$). Notably, *Agni Karma* exhibited more pronounced relief compared to *Lashuna-Eranda Pichu Dharana* ($p<0.05$). In conclusion, both *Agni Karma* and *Lashuna-Eranda Pichu Dharana* are effective in managing direct inguinal hernia, with *Agni Karma* demonstrating greater effectiveness. These findings hold promise for enhancing hernia management and patient outcomes, warranting further exploration and consideration in clinical practice.

Keywords: *Agni Karma, Anthra vriddhi*, Direct inguinal hernia.

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Introduction

Hernia, a condition characterized by the protrusion of an organ or part of it through its containing wall, has been acknowledged since ancient times. The term "hernia" originates from Greek, meaning "to bud" or "to protrude," and from Latin, meaning "to rupture." (Harold Ellis, 2011). In Ayurveda, an ancient Indian medical system, this condition aligns with the concept of *Vriddhi*, encompassing various deformities or diseases in the groin and scrotal region. Among them, *Antra Vriddhi* closely corresponds to inguinal hernia, categorized into subtypes like *Vataja, Pittaja, Kaphaja, Medoja, Raktaja, Mutraja*, and *Antraja* based on their etiology (Kumarasinghe, 1994). Inguinal hernia ranks as the most prevalent abdominal hernia, affecting approximately 1700 cases per 100,000 individuals of all ages and 4000 cases per 100,000 individuals aged over 45 years worldwide (Jenkins et al., 2008). The condition can manifest as either direct or indirect hernia types. The indirect form originates through the deep and superficial inguinal rings and may extend into the scrotum, while the direct hernia protrudes through the posterior wall of the inguinal canal. Early recognition and timely management of inguinal hernia are crucial to prevent potential complications, such as bowel obstruction, incarceration, or strangulation.

Ayurveda provides alternative treatments for hernia, primarily focusing on correcting vitiated *Vatha Dosha* through procedures like *Snehana* (oleation therapy), *Virechana* (purgation therapy), and *Niruha Basti* (medicated enemas). However, Ayurveda treatments often require extended courses, and the possibility of recurrence remains a concern. Modern medicine offers a range of surgical techniques for hernia repair, with mesh repair, such as the Lichtenstein or endoscopic approaches, being the standard of care for primary unilateral inguinal hernia. Although these procedures exhibit low recurrence rates, complications, including post-herniorrhaphy neuralgia, mesh-related issues, and infection, have been reported. Additionally, in resource-limited countries, access to specialized surgical facilities and mesh materials may be limited, necessitating exploration of alternative approaches.

Agni Karma, an ancient surgical technique described in Ayurveda texts, involves therapeutic cauterization. This method has been regarded as superior to *Kshara Karma* (treatment with alkaline substances) due to its efficacy in managing conditions refractory to medical or conventional surgical interventions, with reduced chances of recurrence. In light of the potential benefits of Ayurveda interventions and the need to explore alternative treatment options for direct inguinal hernia, this exploratory study aims to evaluate and compare the effectiveness of *Agni Karma* and prevailing conservative management methods. The hypothesis posits that *Agni Karma* may offer a viable alternative for the management of direct inguinal hernia, potentially complementing or supplementing existing surgical techniques. The aim of this study was to evaluate the effectiveness of *Agni Karma* with comparison of prevailing conservative management method with respect to management of direct inguinal hernia

Material and methods

The clinical study focused on patients with inguinal hernia attending the Shalya clinic of Gampaha Wickremarachchi Ayurveda Teaching Hospital and the outpatient department of Ballaketuwa Rural Ayurveda Hospital. A sample of 60 patients was strategically chosen from a pool of 100

individuals, with 50 patients drawn from Ballaketuwa Rural Ayurveda Hospital and the remaining 50 from Gampaha Wickremarachchi Ayurveda Teaching Hospital. Each patient in the selected sample was assigned a unique identification number ranging from 1 to 100, and the allocation of either the control or trial group was determined through a random assignment of odd and even numbers, ensuring a systemic and unbiased selection process within each hospital stratum. Patients provided voluntary written consent to participate in this study.

The study employed a randomized comparative clinical design with a deductive approach. Diagnosis of *Anthra vriddhi* (inguinal hernia) was based on classical Ayurveda texts and modern criteria. Patient history and examination findings were recorded using a specially prepared Performa and a questionnaire to gather relevant information.

Inclusion criteria encompassed diagnosed cases of direct inguinal hernia in the age group of 45-75 years. Exclusion criteria excluded patients with irreducible, obstructed, strangulated, inflamed, or incarcerated hernias, congenital hernias, and those with chronic obstructive pulmonary disease, tuberculosis, uncontrolled diabetes, or ischemic cardiac diseases.

The intervention phase spanned 30 days. Trial Group received *Agni Karma* with *Pancha Lauha Shalaka* on specific days, while control group underwent *Pichu Dharana* with *Lashuna-Eranda* oil. Both groups were given laxatives to prevent constipation and advised to wear hernia braces during the day and avoid heavy lifting and strenuous exercises.

The operative procedure for *Agni Karma* involved heating *Pancha Lauha Shalaka* to red-hot and placing it over the marked defective area around the superficial inguinal ring, creating a *Valaya Dahana Vishesha*. Post-operative care included applying Aloe-vera gel over the burnt area for healing.

Assessment criteria included both subjective and objective parameters such as pain, range of movement, reducibility, and the size of the hernia lump. Evaluations were conducted at three stages: before treatment, mid-treatment (on day 18), and after the completion of treatment. Data were analyzed using SPSS software version 17.0. Descriptive statistics, including frequencies, proportions, means, and standard deviations, were used to summarize the data.

The effectiveness of treatment over time was assessed using the paired sample t-test (significance level set at $p < 0.05$) for normally distributed data and the Wilcoxon signed-rank test ($p < 0.05$) for non-parametric comparisons. Differences between groups were evaluated using the independent sample t-test ($p < 0.05$) and the Mann–Whitney U test ($p < 0.05$), as appropriate.

Results and Discussion

Demographic and Risk Factor Profile

The study population comprised 60 patients diagnosed with direct inguinal hernia, randomly assigned to the trial group (*Agni Karma*, n=30) and the control group (*Lashuna-Eranda Pichu Dharana*, n=30). The highest prevalence was observed in the 45–48-year age group, accounting for 23.3% in the *Agni Karma* trial group and 16.7% in the control group (Table 1). This finding

aligns with the established understanding that age-related weakening of the abdominal wall is a significant etiological factor in hernia development.

Occupational analysis revealed that general laborers (33.3%) and farmers (20.0% in trial, 26.7% in control) were most affected, likely due to increased physical strain (Table 2). Moderate to vigorous daily physical activity was reported by 53.3% of the trial group and 56.6% of the control group, further supporting the role of physical exertion as a risk factor (Table 3). Smoking was also prevalent (66.7% trial, 60.0% control), consistent with literature linking smoking to impaired connective tissue integrity and higher hernia risk (Table 4).

Table 1: Distribution of cases in this study based on age

Age in years	Trial Group (*Agni Karma*)		Control Group (*Lashuna-Eranda Pichu Dharana*)	
	Number	Percentage (%)	Number	Percentage (%)
45-48	7	23.3	5	16.7
49-52	4	13.3	6	20.0
53-56	4	13.3	4	13.3
57-60	7	23.3	2	6.7
61-64	1	3.3	4	13.3
65-68	3	10.0	5	16.7
69-72	3	10.0	2	6.7
73-76	1	3.3	2	6.7
Total	**30**	**100.0**	**30**	**100.0**

Table 2: Distribution of cases based on occupation

Occupation	Trial Group (*Agni Karma*)		Control Group (*Lashuna-Eranda Pichu Dharana*)	
	Number	Percentage (%)	Number	Percentage (%)
General labor	10	33.3	10	33.3
Professionals	5	16.7	4	13.3
Farmer	6	20.0	8	26.7
Clerical Services	6	20.0	4	13.3
Teacher	3	10.0	4	13.3
Total	**30**	**100.0**	**30**	**100.0**

Table 3: Distribution of the cases according to the daily exercise

Daily Exercise	Trial Group (*Agni Karma*)		Control Group (*Lashuna-Eranda Pichu Dharana*)	
	Number	Percentage (%)	Number	Percentage (%)
Sedentary	7	23.3	4	13.3
Mild Physical Activity	7	23.3	9	30.0

Moderate Physical Activity	12	40.0	13	43.3
Vigorous Physical Activity	4	13.3	4	13.3
Total	**30**	**100.0**	**30**	**100.0**

Table 4: Distribution of cases according to the Smoking and Drinking patterns

Special habits	**Trial Group (*Agni Karma*)**		**Control Group (*Lashuna-Eranda Pichu Dharana*)**	
	Number	**Percentage (%)**	**Number**	**Percentage (%)**
Smoking	20	66.7	18	60.0
Alcohol consumption	1	3.3	1	3.3
Both	5	16.7	8	26.7
None of above	4	13.3	3	10.0
Total	**30**	**100.0**	**30**	**100.0**

Improvement of the Symptoms

The primary clinical symptoms assessed were pain, movement limitation, and hernia lump reducibility. Baseline pain scores (mean ± SD) were 19.0 ± 3.7 (*Agni Karma* trial) and 17.0 ± 3.0 (*Lashuna-Eranda Pichu Dharana* control), while movement limitation scores were 10.0 ± 3.7 (*Agni Karma* trial) and 10.0 ± 3.3 (*Lashuna-Eranda Pichu Dharana* control). Following intervention, both groups demonstrated statistically significant reductions in pain and movement limitation (Wilcoxon signed rank test, $p<0.05$ for all comparisons).

The *Agni Karma* trial group showed a greater reduction in pain (mean post-treatment 0.0 ± 2.6) compared to the *Lashuna-Eranda Pichu Dharana* control group (6.5 ± 3.8), and similarly, movement limitation scores reduced to 0.0 ± 1.1 (*Agni Karma* trial) versus 3.0 ± 2.2 (*Lashuna-Eranda Pichu Dharana* control) (Table 5). Between-group analysis using the Mann-Whitney U test confirmed that *Agni Karma* was significantly more effective than *Lashuna-Eranda Pichu Dharana* in alleviating both pain and movement limitation ($p<0.05$; Table 6).

Table 5: Comparative evaluation according to the pain score and movement limitation score of the direct inguinal hernia patients

Symptoms	**Trial group (*Agni Karma* n=30)**		**Control group (*Lashuna-Eranda Pichu Dharana* n=30)**	
	Pre-treatment	*Post-treatment*	*Pre-treatment*	*Post-treatment*
Pain	19.0±3.6	0.0±2.6	17.0±3.0	6.5±3.8
Movement Limitation	10.0±3.7	0.0±1.1	10.0±3.3	3.0±2.2

Pain and movement limitation scores were assessed using a 0–20 numerical rating scale (NRS), where 0 = no pain/limitation and 20 = worst imaginable pain/limitation. Data are presented as mean ± standard deviation (SD)

Table 6: Statistical Evaluation of Treatment Effectiveness Based on Symptom Reduction in Inguinal Hernia Patients

Test	Group	Pain Score AT –BT	ML Score AT – BT
Wilcoxon signed rank test	*Agni Karma* Trial	P=0.00	P=0.00
	Lashuna-Eranda Pichu Dharana Control	P=0.00	P=0.00
Mann-Whitney U test	U-value	164.500	161.000
	Wilcoxon	629.500	626.000
	Asymp. Sig (2 tailed)	0.000	0.000

(ML Score = Movement limitation Score)

4.3 Reducibility of hernia lump.

Table 7: Comparative evaluation according to the reducibility of hernia lump

Group	Reducability Type	Pre-treatment%	Post-treatment%	Within-group change(Wilcoxon p=)
Agni Karma Trial	No lump	10.0	66.7	P<0.05
	Spontaneously (complete)	66.7	33.3	P<0.05
	Spontaneously (partial)	16.7	0.0	P<0.05
	Manually (Effortless)	6.7	0.0	P<0.05
Lashuna-Eranda Pichu Dharana Control	No lump	6.7	6.7	p>0.05
	Spontaneously (complete)	66.7	86.7	P<0.05
	Spontaneously (partial)	26.7	6.7	P<0.05
	Manually (Effortless)	0.0	0.0	P>0.05
Change in Trial and Control group (Mann Whitney U p=)		0.76	0.00	

Note:
No lump = No palpable hernia lump detected on examination.
Spontaneously (complete) = Lump reduces completely and automatically without assistance.
Spontaneously (partial) = Lump partially reduces on its own, with some residual lump remaining.
Manually (Effortless) = Lump does not reduce spontaneously but can be fully reduced with gentle manual pressure, without resistance or discomfort.

Table 7 demonstrates the comparative evaluation of hernia lump reducibility in the *Agni Karma* Trial and *Lashuna-Eranda Pichu Dharana* Control groups before and after treatment. In the *Agni Karma* Trial Group, pre-treatment assessments showed that 10% of patients had no lump, which increased significantly to 66.7% post-treatment, indicating substantial improvement. Cases with spontaneous complete reducibility decreased from 66.7% to 33.3%, while those with spontaneous partial reducibility and manual effort reducibility were completely resolved post-treatment. In contrast, the *Lashuna-Eranda Pichu Dharana* control group showed minimal

improvement in cases with no lump (6.7% pre-treatment and post-treatment remained unchanged). However, the proportion of cases with spontaneous complete reducibility increased from 66.7% to 86.7%, while spontaneous partial reducibility cases reduced from 26.7% to 6.7%.

Statistical analyses using the Wilcoxon Signed Rank Test confirmed that all within-group changes in the *Agni Karma* trial group were significant ($p < 0.05$), whereas in the *Lashuna-Eranda Pichu Dharana* control group, the changes in manually reducible cases remained insignificant ($p > 0.05$). The Mann-Whitney U Test further revealed no significant difference between the *Agni Karma* trial and *Lashuna-Eranda Pichu Dharana* control groups pre-treatment ($p = 0.763$), but a significant difference emerged post-treatment ($p >0.05$), highlighting the superior effectiveness of *Agni Karma* in improving hernia lump reducibility.

Table 8: Comparative evaluation according to the size of the superficial inguinal ring

Group	Ring Size	Pre-treatment%	Post-treatment%	Within-group change(Wilcoxon p=)
Agni Karma Trial	1 Finger	23.3	83.3	p<0.05
	2 Fingers	70.0	16.7	p<0.05
	>2 fingers	6.7	0	p<0.05
Lashuna-Eranda Pichu Dharana Control	1 Finger	6.7	50.0	p<0.05
	2 Fingers	73.3	36.7	p<0.05
	>2 fingers	20.0	13.3	p<0.05
Change in Trial and Control group (Mann Whitney U p=)		0.030	0.004	

4.4 Size of the superficial inguinal ring

A reduction in the size of the superficial inguinal ring indicates an improvement in the anatomical defect associated with direct inguinal hernia. In clinical examination, the superficial inguinal ring is assessed by estimating how many fingers can be admitted through the ring—fewer fingers correspond to a smaller defect and thus a better outcome.

In this study, a one-finger breadth is considered a near-normal or improved ring size, while a larger ring (two or more fingers) reflects a bigger defect and a higher risk for hernia protrusion. Therefore, an increase in the percentage of patients with a one-finger ring size after treatment demonstrates that the hernia defect has become smaller, not larger.

Specifically, in the *Agni Karma* trial group, the proportion of patients with a one-finger ring size increased from 23.3% pre-treatment to 83.3% post-treatment, indicating that most patients experienced a significant reduction in the size of the hernia defect. Similarly, the *Lashuna-Eranda Pichu Dharana* control group also showed improvement, though to a lesser extent (from 6.7% to 50.0%). These changes reflect a positive therapeutic effect, as a smaller superficial inguinal ring size is associated with improved structural integrity of the inguinal canal and reduced risk of hernia recurrence.

Statistical analyses using the Wilcoxon Signed Rank Test confirmed that all within-group changes were significant ($p < 0.05$). The Mann-Whitney U Test revealed that there was no significant difference between the *Agni Karma* trial and *Lashuna-Eranda Pichu Dharana* control groups at the pre-treatment stage ($p = 0.03$), but a significant difference was observed post-treatment ($p = 0.00$). This highlights the superior effectiveness of *Agni Karma* in reducing the size of the superficial inguinal ring compared to conventional treatment methods.

Measurement of hernia lump

Table 9: Comparative evaluation according to the measurement of hernia lump

Group	N	HW <BT> (cm) Mean ± SD	VW <BT> (cm) Mean ± SD	O <BT> (cm) Mean ± SD	HW <AT> (cm) Mean ± SD	VW <AT> (cm) Mean ± SD	O <AT> (cm) Mean ± SD
Agni Karma trial group	30	5.04± 1.88[a]	4.84± 1.79[a]	1.30± 0.65[a]	1.37± 1.92[b]	1.46± 2.05[b]	0.43± 0.63[b]
Lashuna-Eranda Pichu Dharana control group	30	4.76 ±1.61[a]	4.84± 1.61[a]	1.20 ±0.55[a]	3.99± 1.53[a]	4.02± 1.52[a]	1.00± 0.37[a]

HW = Horizontal width of hernia lump;VW = Vertical width of hernia lump;O = Orifice size; BT = Before treatment; AT = After treatment; SD = Standard deviation; cm = centimeters.

Note: Values are presented as mean ± standard deviation. P-values are from paired t-tests comparing pre- and post-treatment values within each group. A p-value <0.05 is considered statistically significant.

Values with different superscript lowercase letters within the same column are significantly different ($p < 0.05$). Values sharing the same letter are not significantly different. The highest numerical value is assigned (a).

Table 9 presents the comparative mean values of hernia parameters Horizontal Width (HW), Vertical Width (VW), and Hernia Orifice (O) measured before treatment (BT) and after treatment (AT) in both the *Agni Karma* trial and *Lashuna-Eranda Pichu Dharana* control groups.

Before treatment, no statistically significant differences were observed between the two groups for HW, VW, or O ($p > 0.05$), as determined by the independent samples t-test and the Mann–Whitney U test, depending on the data distribution. This is indicated by the use of the same superscript letter (^{a}) across both groups for each parameter.

However, post-treatment values showed statistically significant differences between the groups. In the *Agni Karma* trial group, HW, VW, and O values were markedly reduced compared to the *Lashuna-Eranda Pichu Dharana* control group, and were marked with a different superscript letter (^{b}), denoting significant change. These differences were assessed using the paired sample t-test and the Wilcoxon signed-rank test within each group, and the independent samples t-test or Mann–Whitney U test between groups, with significance accepted at $p < 0.05$. The control group retained higher post-treatment values (still marked ^{a}), indicating minimal change.

These findings suggest that the intervention administered to the *Agni Karma* trial group was significantly more effective in reducing hernia dimensions than the treatment provided to the *Lashuna-Eranda Pichu Dharana* control group.

Conclusion

Both *Lashuna-Eranda Thaila Pichu Dharana* and *Agni Karma* demonstrated statistically significant efficacy in managing direct inguinal hernia. However, *Agni Karma* exhibited superior effectiveness, particularly in smaller hernias, where it achieved near-complete resolution of symptoms and anatomical defects (e.g., 83.3% of *Agni Karma* patients achieved a one-finger superficial inguinal ring size post-treatment vs. 50.0% in the control group). For larger or chronic hernias, prolonged treatment may yield incremental benefits, as evidenced by the progressive reduction in hernia lump measurements (horizontal width: 5.04 ± 1.88 cm to 1.37 ± 1.92 cm; vertical width: 4.85 ± 1.79 cm to 1.46 ± 2.05 cm). These findings suggest that *Agni Karma* is especially advantageous for early-stage or smaller hernias, while extended therapy could enhance outcomes in advanced cases.

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Conflicts of Interest

The authors confirm that they had no conflict of interest.

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