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Original Research Article

Efficacy of panchakarma based ischemia reversal therapy along with diet modification in management of ischemic heart disease

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ABSTRACT

Background: Aim was to evaluate the efficacy of panchakarma-based ischemia reversal therapy combined with diet modification in the management of ischemic heart disease.

Methods: A retrospective, single centre study was conducted at a Madhavbaug clinic in Maharashtra from February 2022 to December 2023. Patients aged 20-75 years diagnosed with ischemic heart disease were included in the study. Follow-up was conducted weekly, for total duration of 90 days. Day 1 and day 90 data were compared

Results: A total of 22 patients with mean age of 58.64 ± 9.81 years were included in this study. VO_{2max} (day 1: 16.34 ± 5.35 mL/kg/min and day 90: 28.11 ± 7.39 mL/kg/min, $p=0.00$), duke treadmill score (day 1: -6.77 ± 4.38 and day 90: 3.77 ± 15.83 , $p=0.00$), and MET value (day 1: 4.66 ± 1.53 and day 90: 8.02 ± 2.10 , $p=0.00$) improved significantly at the 90-day follow-up.

Conclusions: Ischemia reversal therapy has proven to be effective in improving the cardiac capacity of heart, demonstrated by improvement in VO_{2max} . Also improved Duke's treadmill score.

Keywords: Ayurveda, Duke treadmill test, Ischemia, Panchakarma

INTRODUCTION

Ischemic heart disease has emerged as an endemic in India. It is a prominent cause of morbidity and mortality worldwide. The number of individuals in India succumbing to ischemic heart disease has gradually increased over the years.

Insights from global burden of disease study (GBD), non-communicable disease risk factor collaboration (NCDRI), and national family health surveys (NFHS) reveal that from 2000 to 2017, annual ischemic heart disease mortality rose from 0.85 million to 1.54 million.¹

The number of individuals in India succumbing to ischemic heart disease has gradually increased over the

years and moreover the mortality rate exceeds that of the global mortality rate due to the condition. The therapeutic drugs used for the treatment of ischemic heart disease correct the imbalance between oxygen demand and supply to the heart, reduction in blood pressure, reducing platelet aggregation, hypolipidemic action, antioxidant effect.²

Similar action has been found in numerous herbal drugs, which serve as interesting potential targets for newer therapeutic options for treatment of ischemic heart disease. Thus, ayurveda presents as a viable alternative treatment. Ischemia reversal program (IRP) is a combination of Panchakarma and allied therapy. Thus, the present study was designed to assess the efficacy of the IRP as an additional therapy to standard anti-ischemic allied therapy in ischemic heart disease patients.

METHODS

Study design and patient population

A retrospective, single centre study was conducted at a Madhavbaug clinic in Morwadi Pimpri, Maharashtra from February 2022 to December 2023. Patients aged 20-75 years diagnosed with ischemic heart disease were included in the study. Patients with viral disease, antenatal care coverage, recent myocardial infarction, acute congestive heart failure, and acute coronary syndrome were excluded from the study. All patients provided written informed consent for the collection and analysis of the data for research purposes.

IRP

The IRP is a ayurveda-based *Panchakarma* therapy involving 3 steps. One session lasts approximately 65-75 mins. The first step, snehana is centripetal oleation and involves a massage with Abhyanga oil for 30 mins with strokes directed towards the heart in a centripetal manner. The second step, Swedana is thermal vasodilation. It involves passive heat therapy using steam of dashmool kadha. The third step is Per rectal drug administration with concoction of gokshura, haridra and amla for approximately 15 mins. This reduces lipid, water overload and oxidative stress of the body. The treatment plan is outlined in Table 1.

Table 1: Ischemia reversal program.

Steps involved	Product	Mechanism of action	Duration (mins/sitting)	Probable adverse effects
Snehana	Abhyanga oil 100 ml (Til tail)	It reduces peripheral vascular resistance. Til oil is ushna, snigdha, sukshma, srotogami, kapha-vata har. Through local application it pacifies vata, settles down hyper activated sympathetic system, improves elasticity of peripheral blood vessels, improves circulation, relieves congestion, soothes skin, and reduces inflammation.	30 mins	No adverse effect. If patient is allergic to it then chances of rashes are there.
Swedana	Dashmool Kadha	Dashmool kadha is combination of 10 different herbs acting predominantly as vatshamaka. They channelize aggravated vata through swedan and facilitate excretion of metabolic waste through sweat when used as thermal vasodilation.	10-15 min	Chances of skin rash, giddiness due to steam exposure >20 min
Basti 100 ml	GHA Basti Gokshur 15% Haridra 5% Amla 5%	Basti helps absorb medicine through the rectal route faster than oral route. Gokshur in GHA kadha is kledanashka so it helps remove excess salt and toxin from vessels. It has madhur rasa, guru, snigdha attributes and shit virya, madhur vipak and mutral, tridishghna, rasayan properties. Amalki is Madhur vipaki and shit virya, sara, tridoshghna and rasayana. Haridra is katu-tikta, ruksha-ushna, kapha-pitta hara, GHA kadha works in hridrog by breaking its samprapti, it pacifies the vitiated doshas by its tridosh shamak, vatanulomak, srotas shodhana guna and nourishes the rasadi dhatu, GHA improves intrinsic and extrinsic nitric oxide secretion in coronary blood vessels, it has diuretic, hypoglycaemic, cardio protective, analgesic, antispasmodic, anti-inflammatory and anti-coagulant properties. Gha reduces inflammation of the endothelium, improves dilating capacity of blood vessels, protects from oxidative damage and promotes healthy healing. It also reduces edema and congestion thus it is useful in ischemic heart disease.	10 mins	No adverse effects

Statistical analysis

All patient data were collected and coded in a Microsoft excel sheet. Software R 3.4.4 was used to analyze data. Continuous data are expressed as the mean $\pm$ standard deviation, whereas categorical data are expressed as number (frequency). Paired t test was used to analyze the difference in various parameters at day 1 and day 90. A $p < 0.05$ was considered as statistically significant.

Data collection

Data such as age, gender, weight, abdominal girth, heart rate, and blood pressure were recorded at day 1 and day 90. Other variables such as VO_{2max} , MET value, and duke treadmill score were also collected. Data for day 1 were compared with data from day 90. Data was extracted only for patients that had completed at least 7 sessions of the IRP over a duration of 90 ± 15 days. The patient records

wherein complete treatment and follow up details were not available or treatment was changes were excluded from analysis. Adherence to medication on day 1 and day 90 were also noted and compared at follow-up.

RESULTS

Demographics of the study population

The mean age of the study patients is 58.64 ± 9.81 years. Males represented the majority of the study population with 16 (72.73%) patients. Mean weight (day 1: 69.88 ± 15.98 kg and day 90: 64.72 ± 14.81 kg, $p=0.00$) and body mass index (day 1: 26.46 ± 4.80 and day 90: 24.66 ± 4.61 , $p=0.00$) decreased at the 90-day follow-up. VO_{2max} (day 1: 16.34 ± 5.35 mL/kg/min and day 90: 28.11 ± 7.39 mL/kg/min, $p=0.00$), duke treadmill score (day 1: -6.77 ± 4.38 and day 90: 3.77 ± 15.83 , $p=0.00$), and MET value (day 1: 4.66 ± 1.53 and day 90: 8.02 ± 2.10 , $p=0.00$)

increased at the 90-day follow-up. Time of ischemia (day 1: 8.18 ± 2.15 mins and day 90: 12.55 ± 2.61 mins, $p=0.00$) delayed at the 90-day follow-up. The demographic details of the patient population are elaborated in Table 2.

Diet kits and adherence to medication

A low calorie and low carbohydrate diet of 800 to 1000 calories was advised to these patients throughout the 90 days period. Calcium channel blocker (day 1: 7 patients and day 90: 1 patient; percent change: -85.7%), angiotensin II receptor blockers (day 1: 8 patients and day 90: 2 patients; percent change: -75.0%), beta blocker (day 1: 9 patients and day 90: 5 patients, percent change: -4.4%), and diuretics adherence (day 1: 4 patients and day 90: 3 patients, percent change: -25.0%) decreased at the 90-day follow-up. The details for adherence to medication are displayed in Figure 1.

Table 2: Demographics of study population.

Variables	Day 1	Day 90	P value
Age (in years)	58.64 ± 9.81		
Males, n (%)	16 (72.73%)		
Weight, (kg)	69.88 ± 15.98	64.72 ± 14.81	0.00
Body mass index (kg/m ²)	26.46 ± 4.80	24.66 ± 4.61	0.00
Heart rate, (BPM)	79.00 ± 13.16	79.86 ± 14.99	0.51
Systolic blood pressure, (mmHg)	135.45 ± 29.47	124.45 ± 11.38	0.00
Diastolic blood pressure, (mmHg)	82.09 ± 9.18	75.64 ± 8.01	0.01
VO_{2max} , (mL/kg/min)	16.34 ± 5.35	28.11 ± 7.39	0.00
Duke treadmill score	-6.77 ± 4.38	3.77 ± 15.83	0.00
MET value	4.66 ± 2.10	8.02 ± 2.10	0.00
Time of ischemia, (mins)	8.18 ± 2.15	12.55 ± 2.61	0.00

All data are expressed as mean $\pm$ SD.

Table 3: Weight, body mass index, and abdominal girth according to VO_{2max} classification.

VO_{2max} classification	Weight		Change %	Body mass index		Change %	Abdominal girth		Change %
	Day 1	Day 90		Day 1	Day 90		Day 1	Day 90	
Low	62.88 ± 13.12	59.20 ± 11.70	-5.84	23.15 ± 3.30	22.01 ± 2.56	-4.93	85.50 ± 8.17	81.00 ± 6.38	-5.26
Intermediate	72.65 ± 13.19	67.20 ± 12.27	-7.50	27.39 ± 3.90	25.18 ± 4.14	-8.08	97.80 ± 8.06	89.30 ± 8.66	-8.69
Severe	76.60 ± 19.15	72.63 ± 18.61	-5.18	27.67 ± 5.44	26.68 ± 5.01	-3.55	97.67 ± 15.01	94.25 ± 14.50	-3.50

All data are expressed as mean $\pm$ SD.

Table 4: Systolic blood pressure, diastolic blood pressure, and heart rate according to VO_{2max} classification.

VO_{2max} classification	Systolic blood pressure		Change %	Diastolic blood pressure		Change %	Heart rate		Change %
	Day 1	Day 90		Day 1	Day 90		Day 1	Day 90	
Low	129.27 ± 13.32	122.73 ± 8.30	-6.49	78.91 ± 7.72	74.91 ± 7.17	-6.92	73.91 ± 11.82	77.55 ± 15.91	0.00
Intermediate	129.13 ± 15.40	120.75 ± 12.69	-5.06	81.25 ± 10.69	75.63 ± 11.78	-5.07	86.13 ± 10.35	86.13 ± 12.82	4.92
Severe	150.50 ± 24.83	131.83 ± 12.51	-12.40	85.17 ± 7.45	78.17 ± 7.47	-8.22	79.33 ± 11.97	78.17 ± 13.96	-1.47

All data are expressed as mean $\pm$ standard deviation.

Table 5: VO_{2max}, MET value and duke treadmill score according to VO_{2max} classification.

VO _{2max} classification	VO _{2max}		Change %	MET		Change %	Duke treadmill score		Change %
	Day 1	Day 90		Day 1	Day 90		Day 1	Day 90	
Low	26.73± 4.81	32.36± 4.85	21.10	7.64± 1.37	9.21± 1.36	20.62	-3.17± 5.87	0.00± 0.00	-100.00
Intermediate	15.00± 1.62	30.23± 5.12	101.48	4.28± 0.46	8.64± 1.46	101.83	-7.36± 2.81	0.64± 2.01	-108.65
Severe	9.67± 1.04	20.62± 7.36	113.33	2.75± 0.29	5.89± 2.10	114.22	-10.17± 5.86	12.67± 28.32	-224.59

All data are expressed as mean ± standard deviation.

Table 6: Weight, body mass index, and abdominal girth according to duke treadmill score.

Duke treadmill score	Weight		Change %	Body mass index		Change %	Abdominal girth		Change %
	Day 1	Day 90		Day 1	Day 90		Day 1	Day 90	
Low	47.00± 0.00	46.30± 0.00	-1.49	19.81± 0.00	22.30± 0.00	12.57	86.00± 0.00	74.00± 0.00	-13.95
Intermediate	68.48± 17.32	65.67± 16.57	-4.11	24.92± 4.89	23.88± 4.57	-4.20	92.15± 13.61	88.00± 12.51	-4.51
Severe	74.95± 11.71	68.05± 11.57	-9.19	28.06± 3.36	25.49± 4.07	-9.16	96.40± 8.73	87.56± 6.72	-9.17

All data are expressed as mean ± standard deviation.

Table 7: Systolic blood pressure, diastolic blood pressure, and heart rate according to duke treadmill score.

Duke treadmill score	Systolic blood pressure		Change %	Diastolic blood pressure		Change %	Heart rate		Change %
	Day 1	Day 90		Day 1	Day 90		Day 1	Day 90	
Low	128.00± 0.00	127.00± 0.00	-0.78	80.00± 0.00	70.00± 0.00	-12.50	86.00± 0.00	87.00± 0.00	1.16
Intermediate	135.15± 19.96	125.15± 11.35	-7.40	83.15± 10.04	78.92± 9.76	-5.09	76.00± 13.06	81.15± 17.63	6.78
Severe	133.91± 19.91	123.00± 12.58	-8.15	78.91± 7.59	72.91± 7.14	-7.60	82.18± 11.48	79.00± 11.73	-3.87

All data are expressed as mean ± standard deviation.

Table 8: VO_{2max}, MET value and duke treadmill score according to duke treadmill score.

Duke treadmill score	VO _{2max}		Change %	MET		Change %	Duke treadmill score		Change %
	Day 1	Day 90		Day 1	Day 90		Day 1	Day 90	
Low	20.65± 0.00	23.80± 0.00	15.25	5.90± 0.00	6.80± 0.00	15.25	7.00± 0.00	0.00± 0.00	-100.00
Intermediate	18.75± 8.32	27.33± 8.44	45.76	5.35± 2.38	7.80± 2.42	45.70	-3.65± 3.10	5.93± 19.52	-262.62
Severe	15.53± 5.18	29.46± 6.39	89.68	4.43± 1.49	8.39± 1.80	89.57	-11.21± 3.20	0.00± 0.00	-100.00

All data are expressed as mean ± standard deviation.

DISCUSSION

The physicians at Madhavbaug clinic and hospitals have curated an IRP which integrates Panchakarma with combination therapy to target ischemic heart disease. The key benefit of the panchakarma procedure within the IRP lies in its versatility; it can be used as a complimentary treatment alongside an existing therapeutic regimen. This program comprises 3 essential steps-Snehana, which aims

to reduce excess anxiolytic effects, which subsequently leads to a decrease in blood pressure, Swedana which helps lower the myocardial oxygen demand by reducing the body's sodium and water load, and Basti which is instrumental in facilitating the release of nitric oxide, which enhances vascular function and improves circulation. This comprehensive approach allows for a synergistic effect that enhances overall cardiovascular health and patient outcomes.¹

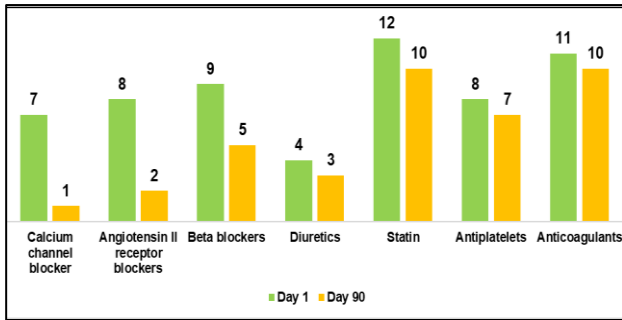


Figure 1: Adherence to medication.

Poor cardiorespiratory fitness is a significant and independent risk factor for cardiovascular disease. VO_{2max} , or maximal oxygen consumption during intense exercise, serves as a robust predictor of cardiac health.³ Large studies have demonstrated VO_{2max} to be the most reliable predictor of future prognosis in individuals with pre-existing cardiovascular disease.⁴ In patients with ischemic heart disease, diastolic dysfunction often leads to reduced VO_{2max} , which clinically manifests as diminished exercise and work capacity.⁵ Thus, VO_{2max} served as a key prognostic parameter in the current and earlier studies. A study of 51 patients documented increase in VO_{2max} from 20.29 ± 6.72 mL/kg/min to 29.40 ± 6.71 mL/kg/min ($p < 0.001$).⁵ Another study of 50 patients reported an increase in VO_{2max} levels from 17.82 ± 7.23 mL/kg/min to 26.65 ± 6.14 mL/kg/min ($p < 0.001$).⁶ Another study of 54 patients observed increase in VO_{2max} from 12.80 ± 5.70 mL/kg/min to 19.40 ± 7.80 mL/kg/min ($p < 0.001$).⁷ IRP therapy has also been evaluated in 19 ischemic heart disease patients with hypertension wherein VO_{2max} levels increased from 20.74 ± 7.25 mL/kg/min to 29.69 ± 6.62 mL/kg/min ($p < 0.001$).⁸ IRP therapy has also been assessed over long-term follow up. A study with a 36-month follow-up revealed an increase in VO_{2max} from 15.57 ± 7.54 mL/kg/min to 23.01 ± 9.60 mL/kg/min ($p < 0.0001$).⁹ The current study also observed an increase VO_{2max} levels and is therefore in agreement with all the aforementioned studies.

A second parameter assessed in the current study was the duke treadmill score. In the current study, the duke treadmill score improved from -6.77 ± 4.38 to 3.77 ± 15.83 ($p = 0.00$). This is in agreement with an earlier similar study that documented an improvement from -9.68 ± 5.66 to 1.22 ± 5.84 at the 90-day follow-up.⁶ Another study reported a decrease from -6 to -1.5 at the 30-day follow-up.¹⁰ Another study documented a decrease from -2.93 ± 5.88 to 3.21 ± 6.03 .¹

Limitations

This study was limited by its retrospective design and a single center. Additionally, the small sample size restricts the ability to generalize the findings to the broader population although the small sample size may also be attributed to the contraindications of treadmill test.

CONCLUSION

IRT has proven to be effective in improving the cardiac capacity of heart, demonstrated by improvement in VO_{2max} . Also improved Duke's treadmill score, signifies reduction in risk of cardiac morbidity and mortality post Ischemia Reversal Therapy.

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