

Effect of Abana on Ventricular Function in Ischemic Heart Disease

J.A. ANTANI, M.D., F.A.C.C.,* R.D. KULKARNI, M.D.,**
and N.J. ANTANI, B.Sc.***

SUMMARY

Mechanocardiography has been in use to evaluate ventricular function and the cardiac effect of drugs. Twenty-five patients with ischemic heart disease (IHD) and 25 patients with IHD and mild hypertension (HTN) were enrolled in a double-blind, placebo controlled study of Abana. Half the patients in each group received Abana—a formulation based on Ayurvedic principles—and the other half received a placebo in a randomized manner. The effect of Abana was evaluated by means of LV apex cardiogram (ACG), phonocardiogram and carotid pulse tracing and ECG (mechanocardiography) before and at the end of 8 weeks of treatment.

As compared to placebo, Abana significantly reduced the frequency and severity of anginal episodes, as judged by clinical improvement and nitrate consumption. Significant improvement in ventricular function was observed as reflected by a decrease in ACG A amplitude and A wave duration, along with a significant increase in LV ejection fraction and VCF. The decrease in double and triple products reflected decreased MVO_2 . A significant fall in diastolic blood pressure was noted in patients with mild hypertension. Abana seems to reduce preload and afterload and improve diastolic function and pump function, which may be responsible for the beneficial effects of Abana in ischemic heart disease.

Additional Indexing Words:

Ayurvedic cardiac drug Antianginal drug Mechanocardiography

MECHANOCARDIOGRAPHY is a sensitive technique to measure the important indices of left ventricular ejection function¹⁾ and ventricular relaxation. It is found to have a higher correlation with direct angiographic measurements than the same indices derived from the echocardiogram,¹⁾ and these indices are found to be reproducible in patients with

From the Department of Cardiology, M.R. Medical College, Gulbarga, India.

* Professor and Head, Department of Cardiology, M.R. Medical College, Gulbarga, India.

** R and D Centre, The Himalaya Drug Co., Bombay, India.

*** Research Assistant, Gulbarga Heart Research Centre, Gulbarga, India.

Received for publication October 27, 1989.

Accepted April 28, 1990.

stable coronary disease and unstable disease followed up longitudinally.²⁾ This technique has been useful in the evaluation of cardiovascular drugs (prazosin,³⁾ lidoflazine⁴⁾ and nitroglycerin ointment¹⁾ in earlier studies.

Abana, a herbomineral indigenous proprietary preparation, is reported to be effective in hypertension⁵⁾ and ischemic heart disease, as demonstrated clinically and through exercise testing.^{6),7)} This study was designed to evaluate the effects of Abana on ventricular function in patients of ischemic heart disease, with and without hypertension.

MATERIALS AND METHODS

Fifty patients with IHD, between 30 and 75 years of age, reporting frequent episodes of anginal pain were enrolled in the study. Twenty-five patients in Group A had mild hypertension, while the other 25 patients in Group B had a history of only anginal attacks and normal blood pressure. They gave a history of 1 to 5 episodes/day for more than 3 months and also had a positive exercise test. After informing them clearly regarding the effects of Abana as well as of each of its ingredients, informed written consent was obtained.

The patients in both Groups A and B were further randomly allocated into 2 subgroups, to receive either the active drug or identical placebo in a double-blind, placebo controlled study. The patients did not receive any other medication except isosorbide dinitrate 5 mg, sublingually during the acute anginal attack. The dose of Abana/placebo was 3 tablets twice a day for 8 weeks. This trial period was preceded by a 2-week, placebo run-in period. The standard mechanoparameters of ventricular function, i.e. A amplitude, A wave duration, IVRT,²⁾ RFWT/SFWT⁸⁾ (diastolic function) and systolic function, LVEF and VCF,¹⁾ LVET, TIVC, PEP and PEP/LVET,⁹⁾ were studied serially for evaluation of Abana and its comparison with placebo. Mechanocardiography was performed at the bedside before the treatment period, i.e. after placebo wash-out period (baseline) and at the end of the 8 week trial period. Left ventricular apex cardiography was performed according to the technique of Wayne²⁾ and Antani.¹⁾ ECG, carotid pulse tracing and phonocardiogram were also recorded (at 100 mm/sec) simultaneously to obtain a noninvasive evaluation of hemodynamics, global LV function and diastolic function.^{1),2),8),9)}

Clinical status was evaluated at week 0 and at week 8 by recording the supine blood pressure and heart rate (ECG). Patients were given special record sheets to note the number of anginal episodes and nitrate consumption/day. The patients were also followed up every week in the research

unit to note their weekly episodes of angina, nitrate consumption and medication compliance. During weekly follow-ups, the patients were also interrogated for side effects, if any.

RESULTS

The mean number of anginal episodes and nitrate consumption/day in the 2 groups of patients, i.e. IHD with hypertension (Group A) and IHD (Group B), are shown in Table I, A and B. There was no significant difference between the 2 groups in number of anginal episodes and nitrate consumption before commencement of therapy. However, at the end of 8 weeks there was significant (unpaired t-test) reduction in both number of anginal episodes as well as nitrate consumption in both groups of patients receiving Abana compared to baseline. There was also a reduction from baseline in patients receiving placebo; however, this was not significant. The difference between the Abana and placebo groups at the end of the treatment period

Table I. Mean Daily Anginal Episodes and Nitrate Consumption before and after Abana Treatment in IHD Patients

A. (IHD and Hypertensive Patients)

Treatment	Number of anginal episodes		Nitrate consumption (mg)	
	Before	After	Before	After
Abana (n=13)	2.85±0.45	0.69±0.29*	3.63±0.66	0.85±0.37*
Placebo (n=12)	3.33±0.33	2.83±0.73**	3.67±0.48	3.58±1.03**

B. (IHD Patients)

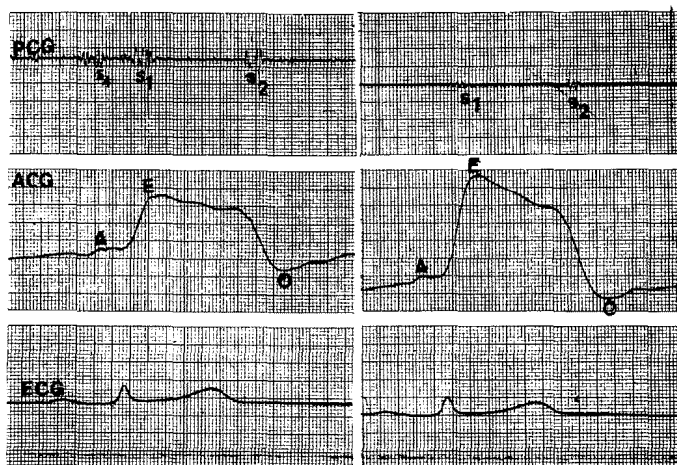
Treatment				
Abana (n=13)	3.08±0.43	1.85±0.56*	4.08±0.49	2.15±0.82*
Placebo (n=12)	3.17±0.41	2.42±0.69	4.25±0.41	3.33±0.33

* p<0.01 as compared to week 0, ** p<0.01 as compared to placebo.

Table II. Mean Systolic and Diastolic Blood Pressure (mmHg) before and after Abana Treatment in Patients with IHD and Hypertension

Treatment	Systolic blood pressure		Diastolic blood pressure	
	Before	After	Before	After
Abana (n=13)	169.69±4.62	146.00±5.64*	95.38±1.89	87.38±2.24*
Placebo (n=12)	165.00±3.86	149.33±5.61**	94.58±1.52	93.75±1.79***

* p<0.001 as compared to week 0, ** p<0.01 as compared to week 0, *** p<0.05 as compared to placebo.

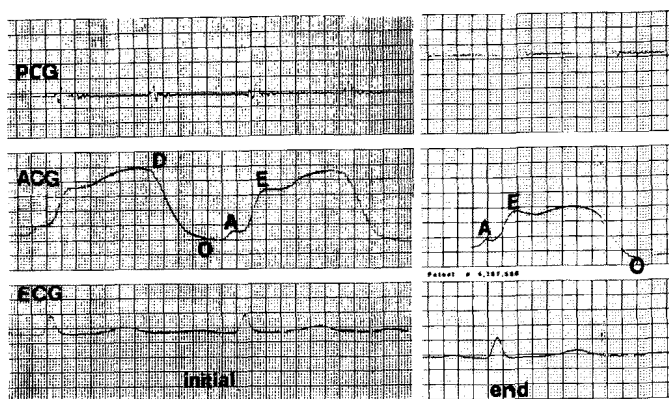


Mechanoparameters	Initial values	Post-treatment values
A wave	12%	6%
A duration	100 msec	90 msec
PEP/LVET	0.43	0.42
LVEF	56%	60%

Fig. 1. A typical apex cardiogram of a patient with IHD with two-vessel CAD before and after Abana treatment. PCG=phonocardiogram; ACG=left ventricular apex cardiogram; ECG=electrocardiogram.

also was significant in the patients with IHD and hypertension, the Abana group having significantly fewer episodes and lower nitrate consumption. In the hypertensive group, the lowering of systolic blood pressure at the end of 8 weeks was observed in patients receiving both Abana and placebo. However, the diastolic blood pressure was significantly lowered in patients on Abana compared to those on placebo at the end of 8 weeks (from 95.38 ± 1.89 to 87.38 ± 2.24 mmHg) (Table II).

The A amplitude and A wave duration (parameters of LV diastolic function) before and after Abana/placebo administration in patients with IHD and hypertension and IHD alone are shown in Table III. Initially, the pre-treatment values were not different in the Abana and placebo treatment groups. The A amplitude and A wave duration decreased significantly from $13.83 \pm 1.56\%$ and 75.86 ± 3.91 msec to $10.71 \pm 1.26\%$ and 67.72 ± 3.58 msec respectively with Abana treatment. The A amplitude increased significantly from 12.27 ± 1.78 to $14.55 \pm 1.45\%$ and the A wave changed from 73.45 ± 2.99 to 76.95 ± 4.26 msec with placebo (Table III). At the end of 8 weeks of therapy, the parameters with Abana treatment changed favourably. The difference between the 2 subgroups in both Groups A and B was significant indicating improved LV relaxation and better diastolic



Mechanoparameters	Initial values	Post-treatment values
A wave	15%	10%
A duration	70 msec	60 msec
LVEF	44%	60%
VCF	0.70	0.92
PEP/LVET	0.47	0.39

Fig. 2. The beneficial effect of Abana on ventricular function in a patient with IHD and hypertension.

Table III. Mean A Amplitude (%) and A Wave Duration (msec) before and after Abana Treatment in Patients with IHD

	A amplitude (%)		A wave duration (msec)	
	Before	After	Before	After
Treatment				
Abana (n=24)	13.83±1.56	10.71±1.26*	75.86±3.91	67.71±3.58*
Placebo (n=22)	12.27±1.78	14.55±1.45***	73.45±2.99	76.95±4.26***

* $p < 0.01$ as compared to week 0, *** $p < 0.05$ as compared to placebo.

Table IV. Mean Ejection Fraction (EF) and Velocity of Circumferential Fiber Shortening (VCF) before and after Abana Treatment in IHD Patients

	EF (%)		VCF (unit)	
	Before	After	Before	After
Treatment				
Abana (n=26)	57.73±1.77	64.88±1.32*	0.93±0.09	1.09±0.10*
Placebo (n=24)	55.88±1.96	49.04±2.39***	0.92±0.04	0.79±0.04***

* $p < 0.001$ as compared to week 0, *** $p < 0.005$ as compared to placebo.

filling with a fall in LVEDP (A wave being the noninvasive parameter²⁾ reflecting LVEDP) with Abana. Global LV ejection fraction showed significant improvement as did velocity of circumferential fiber shortening with

Abana in these patients in comparison with those on placebo (Table IV).

Figure 1 shows the typical apex cardiogram of a patient with IHD with two-vessel CAD before and after Abana treatment. As can be seen there is improvement in the systolic wave slope of the ACG (right panel) and other parameters of LV function.

Figure 2 shows the beneficial effect of Abana on ventricular function in 1 patient with IHD and hypertension. The A wave amplitude and duration along with ejection fraction, shows improvement after Abana treatment, and abnormal LV wall motion (dyskinesis (D)) seen in the systolic wave of the ACG initially is corrected at the end of the treatment period.

DISCUSSION

Abana is a complex herbal preparation with important plant ingredients such as arjuna, aswagandha and punarnava with their known beneficial effects in cardiovascular disease reported in the Indian system of medicine. Arjuna is known to have a positive inotropic action.¹⁰⁾ Aswagandha has adaptogenic activity¹¹⁾ while punarnava has diuretic activity.¹²⁾ It is possible that some ingredients might have vasodilator activity and hence a beneficial effect in reducing B.P. in hypertensives.⁵⁾

Yajnik and Vatsraj have demonstrated the beneficial effect of Abana in relieving angina and on effort tolerance. The effort tolerance of the patients improved significantly⁷⁾ from 410.00 ± 31.26 to 547.90 ± 35.96 sec, while the cumulative ST depression showed a significant decrease from 4.29 ± 0.30 to 3.06 ± 0.19 mm. Twenty-two patients were able to complete stage 3 in TM exercise at the end of the treatment period as compared to 17 patients at the beginning.⁷⁾ In the other study of Abana in unstable angina, Satyamurthy et al observed definite improvement in the anginal status with Abana but not with placebo.⁶⁾ The present study objectively demonstrates the beneficial effect of Abana on clinical anginal status and global ventricular function in patients with IHD and IHD with hypertension.

Abana caused significant improvement in pump function in comparison to patients receiving placebo. The left ventricular ejection fraction (EF) significantly improved after Abana therapy, whereas patients receiving placebo showed deterioration. In those patients on placebo lower EF values were observed at the end of the trial period.

The load independent index of ventricular function VCF also improved significantly with Abana in patients with IHD as well as in those with IHD and hypertension, whereas patients receiving placebo showed depressed myocardial contractility.

A wave amplitude, A wave duration, IVRT, total diastolic time and RFWT/SFWT reflect diastolic function. Significant reduction in preload as judged by A wave % in patients receiving Abana was recorded. The diastolic relaxation as shown by the noninvasive compliance ratio⁸⁾ improved in patients on Abana but not on placebo.

Abana also reduced the afterload without significantly altering the heart rate. The double and triple products which are indirect indices of MVO_2 , showed significant decreases, indicating improvement in ventricular function.

The Ayurveda describes many combinations of ingredients in different proportions designed to achieve optimum effect of the formulations. Abana is one such Ayurvedic formulation of promise which was found to have beneficial action on ventricular function in patients with IHD and IHD with hypertension. The vasodilatory and positive inotropic properties of the ingredients of Abana may have been responsible for these desirable effects.

REFERENCES

1. Antani JA, Wayne HH: Ejection phase indexes by invasive and non-invasive methods: An apex cardiographic, echocardiographic and ventriculographic correlative study. *Am J Cardiol* **43**: 239, 1979
2. Wayne HH: Non-invasive Technique in Cardiology, 1st Ed (reprint), Year Book Medical Publisher Inc, Chicago, p 55-152, 1979
3. Antani JA: Prazosin in hypertension with heart failure. *J Cardiovasc Pharmacol* **1** (suppl 552): 556, 1979
4. Antani JA, Sharma U: Comparative evaluation of the effects of lidoflazine and propranolol on left ventricular function in ischaemic heart disease: A mechanocardiographic study. *J Cardiol (Japan)* **14** (suppl V): 279, 1984
5. Dadkar VN, Tahiliani RR, Jaguste VS, Damle VE, Dhar HL: Double-blind comparative trial of Abana and methyl dopa for monotherapy of hypertension in Indian patients. *Jpn Heart J* **31**: 193, 1990
6. Satyamurthy I, Subramanian D, Ramachandran P, Reddy PC: Efficacy of Abana in severe coronary artery disease. *Ind Heart J* **40** (abstract issue): 339, 1988
7. Yajnik VH, Vatsraj DJ: Evaluation of Abana in chronic stable angina. *Ind Heart J* **40** (abstract issue): 399, 1988
8. Benchimol A: A study of period of isovolumic relaxation in normal subjects and in patients with heart disease. *Am J Cardiol* **19**: 196, 1967
9. Weissler AM, Garrad CL Jr: Systolic time interval in cardiac disease. *Mod Conc Cardiovasc Dis* **50**: 1, 1970
10. Dwivedi S, Somani PN, Chansouria JPN, Udupa KN: Cardioprotective effects of certain indigenous drugs in myocardial ischaemia in rabbits. *Ind J Exp Biol* **26**: 969, 1988
11. Bhargava KP, Singh N: Antistress activity in Indian medicinal plants. *J Res Edu Ind Med* **IV-4**: 27, 1985
12. Mudgal V: Comparative studies on the anti-inflammatory and diuretic action with different parts of the plant *Boerhaavia diffusa* Linn (Punarnava). *J Res Edu Ind Med* **9**: 2, 1974