Experimental Evaluation of Crataegus Oxycantha on Cardiovascular System in Comparison to Digoxin

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Research Article

Abstract: Crataegus Oxycantha administrations resulted in increase in force of contraction of cardiac muscles in frog's heart in situ and isolated perfused rabbit heart. The coronary flow was improved with all doses in isolated perfused rabbit heart and was significant. So *Crataegus Oxycantha* seema to improve the cardiac functioning in experimental animals and may show the same result in human beings which requires elaborate experimental designs.

Keywords: Crataegus Oxycantha, refluxations, CHF, Hypodynamic

Introduction

Congestive Heart failure (CHF) is a common problem throughout the globe and is associated with high morbidity and mortality. Several botanicals including *Crataegus Oxycantha* (CO), have been found to have therapeutic benefit for the treatment of cardiovascular diseases. *Crataegus Oxycantha* has been used traditionally as a cardio-tonic and current used include treatment of angina, hypertension, arrhythmias and congestive heart failure. It is an ornamental tree, 20-30ft. high, met within north-western Himalayas from Indus to Ravi, at altitudes of 6000-9000 ft. The present was planned to evaluate the effect of (CO) on heart rate, amplitude of contraction of frog heart and on heart rate, amplitude of contraction along with coronary flow of rabbit heart so as to compare it with digoxin a standard ionotropic agent.

Methodology

Alcoholic extract of Crataegus Oxycantha obtained from berries was evaporated to dryness by process of refluxation. Dried extract collected was weighed and dissolved in distilled water to prepare a stock solution of 10 mg/ml and further dilutions were made as per the requirements.

Frogs(125-150gms) and rabbits(1.5 to 2.5 kg) of either sex were used in the study. Eight animals were used for each set of experiments. Frogs were kept in clean tank of water provided with all the favourable environmental conditions. Rabbits were house in plastic cages and provided standard diet water ad-libitum. Ethical norms were strictly followed during all experimental procedures which were approved by the institutional animal ethics committee. Following experiments were performed:

Study on Frog's heart in situ

A perfused heart preparation of an abult frog was mounted as per the method described by Burn (Burn, 1952). Sensitivity of the heart was tested by administering adrenaline hydrochloride 2 ug in the inferior vena cava which caused increase in heart rate as well as force of contraction. Digoxin and CO were administered in the graded doses and their effect on heart rate and amplitude of contractions were recorded using a kymograph. Now the frog's heart was made hypodynamic by using three ways cannula, one limb of cannula was connected to normal frog ringer's solution and other was connected to frog ringer's solution containing ¼ calcium chloride as described by Kulkarni (Kulkarni, 1999). Initially ringer containing ¼ calcium chloride was infused and when the heart failed (i.e when the rate and force of contraction decreased), the drugs digoxin and CO were administered in the inferior vena cava in graded doses. Effects of drugs on heart rate and amplitude of contraction were recorded using a kymograph.

Study on Isolated perfused rabbit heart:

Isolated rabbit heart were mounted as per the method described by perry in the langendroff's assembly (Perry, 1970). The drugs digoxin and CO were admimistered in graded doses. Heart rate and amplitude of contractions were recorded using a kymography for 1 minute after injecting each drug in the aorta through a rubber cannula. At the same time coronary flow was measured for 1 minute by measuring the drops of the fluid leaving the heart.

Results

The results were expressed as mean + **SE** and analysed using students "t" test. In the present study, Crataegus Oxycantha increased the force of contraction of cardiac muscles but the results were significant on isolated perfused rabbit heart. The coronary flow was improved with all doses in isolated perfused rabbit heart and it was maximum at a dose of 40 ug/kg.

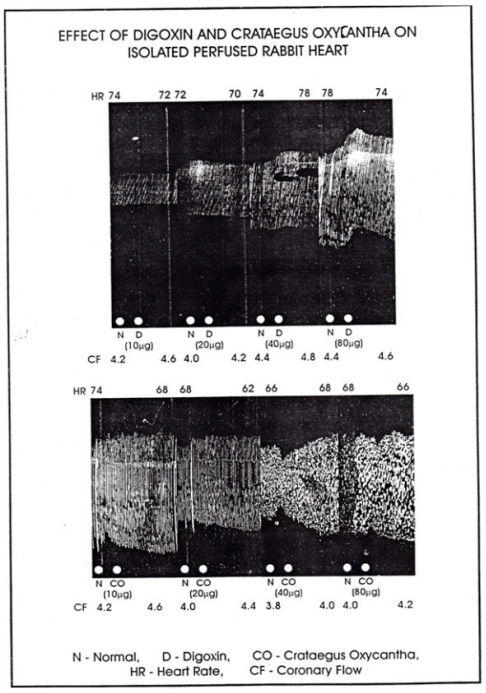

Table 1: Effect of Digoxin on Isolated Perfused Rabbit Heart

Dose (ug)	Change in Amplitude Mean +SE (Before)	Change in Amplitude Mean +SE(After)	Mean % age change	P value
10	28.25+3.53	36.25+3.60	7.08	<0001
20	25.63+2.71	28.50+2.72	11.21	<0.05
40	29.88+4.89	35.00+6.87	17.99	<0.05
80	31.25+5.42	36.75+6.07	17.61	<0.05

Mean percentage change in Amplitude (mm) (p value)(n=8)

Table 2: Effect of Crataegus Oxycantha on Isolated Perfused Rabbit Heart

Dose (ug)	Change in Amplitude Mean +SE (Before)	Change in Amplitude Mean +SE (After)	Mean % age change	P value
10	27.00+4.05	33.75+4.95	25.00	<0.01
20	24.12+3.41	29.37+3.85	21.76	<0.01
40	18.87+3.74	24.62+3.87	30.46	<0.01
80	22.37+3.78	26.75+3.97	19.55	<0.001

Mean percentage change in Amplitude (mm) (p value) (n=8)

Discussion and conclusion

In the present study improvement in the amplitude of contraction is evident where as cardio-protective activity of *Crataegus Oxycantha* may be due to its radical scavenging and inhibition of human neutrophil elastare (HNE) by oligomeric proanthocyanidine fragment of the leaves and flowers (Millew, 1980). Schwinger at al found that Crataegus extract WS 1442 increases force of contraction in human myocardial cells. (Schwinger et al, 2000). The present study endorses the already mentioned above effects of the herb Crataegus Oxycantha and can be useful for Cardiovascular protection after clinical verifications. The present study concludes that CO can be a useful tool in the hands of physicians and cardiologists to treat cases of congestive heart failure without the unwanted affects like vomiting and bradycardia as compared to digoxin. However further preclinical exploratory studies are required to confirm the present findings.

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