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Anesthetic effect of certain indigenous drugs in Indian system of medicine

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ABSTRACT

The experimental study had been carried out on Albino rats of weight 100-110gms. The alcoholic extract of the five herbal drugs viz. Bhang (Cannabis sativa), Vacha (Acorus calamus), Jatamansi (Nardostyachya jatamansi), Sarpagandha (Rawolfia serpentina) and Parsik yavani (Hyoscynanus niger) was used. The anesthetic effect were assessed after intra peritoneal injection of aqueous suspension of alcoholic extract of the above five drugs. The time required for the induction of sleep i.e. induction time, dullness time and sleeping time after the injection of the drugs were recorded for the assessment. It was observed that all the drugs increased the sleeping time, but there were some variations in their effect on induction time as well as dullness time.

Findings were compared with 4mg/100gm of sodium pentothal; known sedative and anesthetic agent. The attempt had also made to find out whether some of those drugs bring about potentiating effect with 2mgs/100gms of sodium pentothal. Only three drugs out of five viz. Bhanga, Vacha & Jatamansi were injected to animals in the dose of 30mg/100gm along with sodium pentothal in the dose of 2mgs/100gms. Finally it was found that Bhanga was most sedative for long period as compare to other. Jatamansi potentiate the action of sodium pentothal. Vacha was 3rd sedative drug in five compared drugs. Sarpagandha and Parsik yavani were very less effect of the sedation. Lastly it had reported that Bhang and Jatamansi had got definite anesthetic properties.

Key Words Albino rats, Bhanga, Jatamansi, Parsik yavani, Sarpagandha, Sodium pentothal, Vacha.

INTRODUCTION

The Ayurvedic drugs which are mentioned in classics as sedative and analgesic were taken for the experimental study. It was the effort only to bring out the facts from ancient literature and prove an anesthetic property of some Ayurvedic drugs. The objective was to prepare a ground for future researches that might helpful on neglected subject of the anesthesia. What exactly expected from ancient system of medicine is new idea which can be tested by modern scientific methods. Nothing will be developed by experiment and method except the ideas submitted to it. The concepts have been suggested several centuries ago, yet their validity and utility can be tested now by using all new and advanced scientific methods. The main purpose for doing scientific researches in Indian medicine is to find out more effective and useful drugs for anesthesia. Many researchers in this country and abroad have started research on the indigenous drugs of India. Some drugs already proved their efficacy on crude form in ancient time. Now the researches have been carried out on such drugs to isolate the active principles which are responsible for beneficial

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result. In the study the research work had been carried out to found anesthetic effect of Bhang (*Cannabis sativa*), Vacha (*Acorus Calamus*), Jatamansi (*Nardostyachya Jatamansi*), Sarpagandha (*Rawolfia serpentina*) and Parsik yavani (*Hyoscynanus niger*). All those drugs are well known for their analgesia and sedative properties. They are also used in psychological disorders (Manasik vikar) like Unmada, Apasmar and Attwabhinivesh.[1]

Before time of anesthesia operations were horrible and surgeons attempted to shorten the agony by working with grate haste. So careful surgery and delicate treatment of tissues was impossible. Humphary Davy (1800) first discovered the anesthetic action of N_2O or laughing gas. Genes Simmsans successfully used chloroform in obstetric patient. In 1917 Boyle's apparatus was used in anesthesia. Spinal anesthesia was first described in Germany in 1898. The first report was made by Scherzer that chewing coca leaves caused a feeling of numbness in the tongue.

The technique of the operation and removal of the diseased part had been practiced from older days. It is possible that they must have using anesthetic medicine before operation. But unfortunately we do not have any references to this practice in the ancient Ayurevedic texts. Sushruta says that patients should be given hitakar ahar and strong wine that are habituated[2]. Due to wine there will be madotpati, patient will not feel any pain during the operation. Sushruta had described the guna of madya and visha are laghu and ruksha that are opposite the oja guna so patient went in murcha[3]. Samohan churna had given to Raja Bhoja for performing surgery on head to make unconsciousness and after surgery Sanjivani drug given for reverse the effect. With that reference it was clear that there was anesthetic medicine in the ancient time. Besides we also have some medicines found in the Ayurvedic text for pain relief viz. use of Bhanga (Canabis indica) in painful condition of Arsha[4]. All major and minor procedures have been described in detail and quite vividly in Ayurved text. The attempt had made to evaluate the sangynasak effect of indigenous drug sby animal experiment.

AIMS AND OBJECTIVES

1. To evaluate the experimental anesthetic effect of Herbal drugs in the form of extract.

2. To reduce quantity of modern anesthetic drugs by adding herbal anesthetic drugs.

MATERI AND METHODS

CONCEPTUAL STUDY

All concepts and data related to anesthesia at the ancient time and in modern science have been reviewed from the concerned Ayurvedic as well as from modern texts.

ANIMAL

Male albino rats of weighing 100-110gms 6 in each group total 30.

DRUG REVIEW

The drugs used for the experimental study had been studied in detail with their pharmacological action and uses.

Bhanga[5]: (*Cannabis sativa*): The drug acts like opium, in first stimulating the nerves system and after words depressing the vital functions. Canabinus is used in medicine to relieve pain and to encourage sleep. Alkaloids-Canabinone- it had powerful narcotic action.

Vacha[6]: (*Acorus calamus*): Its aromatic root stock is carminative and is used as tonic in dyspepsia and colitis. It is supposed to be antidote for several poisons. Volatile oil- acorin, bitter principle- acaretin

Jatamansi[77]: (*Nardostyachya jatamansi*): It increase the luster of eyes, improves growth and blackness of hairs, useful in sleep, cough, pain in chest. It is also used in management of epilepsy, hysteria and convulsion. It contains alkaloid principle- cystanthine

Sarpagandha[8]: (*Rawolfia serpentina*): It possesses well marked sedative properties. When 20-30 gm powdered root given twice daily it acts as sedative and reduce of blood pressure (Sen & Bose). It contains alkolois- ajamaline, serpentine, serpentinine, (R.H. Sidhiqui 1931).

Parsik yavani[9]: (Hyoscynanus niger): Hyoscyamine is sedative, antispasmodic, mydriatic (dilate pupil), used in insomnia, palpitation, debility and hysteria. Active principle -Hyschamine, 3 alkoloids- atropine, hyosohypamine, hyoscine.

The Above mentioned drugs were administrated in extracts form for experimental study on Albino rats. The purpose is to administer only active principles of above drugs that were soluble in alcohol. Drugs taken from pharmacy of Gaujarat Ayurveda University in powder form then dried them and they were separately extracted in 60% alcohol by cold percolation method. Finally 100gm of dry powdered drugs mixed with 250ml of 60% alcohol, mixture kept overnight and filtered. Then mixed and concentrated to a small volume by vacuum distillation and then evaporated over water bath. That extract was kept in the desicater to avoid air moisture.

Sodium pentothal[10]: 500mg vial of sodium pentothal had dissolved in 20 ml sterile water and used for experimental study to compare with Ayurvedic drugs. This 500mg vial is dissolved in 50ml distilled water is given to rats 0.4 mg/100gm body weight.

EXPERIMENTAL STUDY

Three sets of the experiments were carried out on laboratory animal. The alcoholic extract of Bhanga, Vacha, Jatamansi, Sarpagandha and Parsik yavani was prepared by cold percolation method and dried. These extracts were injected intra peritoneal in 30 healthy young Albino rats weighing between 100-110gms. The observations were done for maximum sleeping effect, time interval for inducing sleep i.e. induction period. These Rats were secured from Sarabhai research Centre, Baroda, after accumulating those to the laboratory.

In 1st set of experiment five groups each consisting of 6 animals was made for the trials of drug separately as follows.

1. Group 1st Bhanga treated
2. Group 2nd Vacha treated
3. Group 3rd Jatamansi treated
4. Group 4th Sarpagandha treated
5. Group 5th Parsik yavani treated

In the 2nd sets of experiment the effective dose of the alcoholic extract of the each drug required for inducing maximum sleep was compared with 4mg/100gm body weight of sodium pentothal. The time interval required for inducing sleep after injection was also compared in these experiment. Distilled water was injected as a control.

In 3rd set of experiment three drugs only i.e. Bhanga, Vacha and Jatamansi (treated group) were compared with control (Distilled water group) and known control group (sodium pentothal group). After completion of the first set of experiment the same rats were taken after 15 days of first experiment. The groups were made as follow:

1. Group 1st control distilled water
2. Group 2nd known control (sodium pentothal)
3. Group 3rd Bhanga treated
4. Group 4th Vacha treated
5. Group 5th Jatamansi treated

In that experiment the attempt had made to find out whether alcoholic extract of the Bhanga, Vacha and Jatamansi can either potentiate or inhibit the effect of the sodium pentothal. Hence the effective dose of the drugs were injected (30mg /100gm) into separate group of animals along with sodium pentothal (2mg/100gms body weight) and the results were compared with sodium pentothal and distilled water.

DRUG ADMINISTRATION

On the first day of the first week the prepared alcoholic extract of 5 mg (50mg /kg of body weight) was dissolved in 1cc of distilled water likewise the quantity of the extract was increased to 10, 20, 30, 40, and 50 mg/ cc of distilled water and administrated by injecting respectively in the 2nd, 3rd, 4th, 5th and 6th week. In the above procedures all the five drugs were administrated separately in separate group.

INJECTION PROCEDURE

The animal was handed by assistant in such a way that entire ventral surface come into clear vision. In the meanwhile a 24 no. hypodermic needle fitted to a hypodermic syringe loaded with 1cc of the prepared solution was taken. It was kept in the right hand and then by the left hand the abdominal surface of the rat was washed with wet cotton swab and the injection was given slowly in the peritoneum. Immediately after injection the rats were kept in their respective cages for observations.

In another set of experiments the effective dose of the alcoholic extracts of each drug required for inducing maximum sleep was compared with one dose of 4 mg /100gm body weight of sodium pentothal. The time interval required for inducing sleep after injection of the dose was also became dull just as felt before sleeping. The dullness continued up to a certain period according to the efficacy of the particular drug. Then such type of attitude was not prolonged for more time and lasted till the beginning of the next stage. In the next phase the rats went on sleeping showing the different, the duration of sleeping period was watched. Self disturbances were seen in some of the rats which indicated unsound sleep.

DIET AND SANITATION

All the animals were fed with the same normal laboratory diets which include cereals, wheat powder, chana and some green leaves. Due attention was always paid to see that a bottle full of water was present within cages to assess the animals. Perfect sanitation of animal house was maintained throughout the experiments. All the cages were being washed daily and the ventilation was also kept perfect.

OBSERVATIONS

Table 1: Induction period

Name of the Drug	Doses of the drugs					
	5mg	10mg	20mg	30mg	40mg	50mg
	Time in minutes					
Bhanga	15	10	20	10	60	55
Vacha	20	20	40	10	90	80
Jatamansi	30	50	30	20	90	85
Sarpagandha	70	30	60	20	70	30
Parsika yavani	60	40	80	10	90	35

Table 2: Dullness period before sleep

Name of the Drug	Doses of the drugs					
	5mg	10mg	20mg	30mg	40mg	50mg
	Time in minutes					
Bhanga	5	5	5	5	20	20
Vacha	10	10	15	5	30	30
Jatamansi	15	25	15	10	30	25
Sarpagandha	20	10	20	10	20	10
Parsika yavani	20	15	20	5	30	10

Table 3: Duration of the sleep

Sr. No.	Name of the Drug	Doses of the drugs					
		5mg	10mg	20mg	30mg	40mg	50mg
		Time in minutes					
1.	Bhanga	40	48	85	68	50	68
2.	Vacha	65	28	70	60	20	65
3.	Jatamansi	39	45	75	60	10	70
4.	Sarpagandha	26	46	38	65	20	73
5.	Parsika yavani	30	60	25	60	18	77

Table 4: Comparison of induction dullness and sleeping period with 30mg dose of drugs with 4mg of dose of sodium pentothal:

Name of the Drug	Time in minutes		
	Induction	Dullness	sleep
Sodium Pentothal 4mg	10	5	96
Bhanga 30mg	10	5	68
Vacha 30mg	10	5	60
Jatamansi 30mg	20	10	60
Sarpagandha 30mg	20	10	65
Parsika yavani 30mg	10	5	60

Table 5 Maximum and minimum induction period

Name of the Drug	Dose in mg.	Maximum induction period in min.	Dose in mg.	Minimum induction period in min.
Sodium Pentothal	4	10	4	10
Bhanga	40	60	30	10
Vacha	40	90	30	10
Jatamansi	40	90	30	20
Sarpagandha	40	70	30	20
Parsika yavani	40	90	30	10

Table 6 Maximum and minimum dullness period

Name of the Drug	Dose in mg.	Maximum dullness period in min.	Dose in mg.	Minimum dullness period in min.
Sodium Pentothal	4	15	4	5
Bhanga	40	20	30	5
Vacha	40	30	30	5
Jatamansi	40	30	30	10
Sarpagandha	40	20	30	10
Parsika yavani	40	30	30	5

Table 7 Maximum and minimum sleeping time

Name of the Drug	Dose in mg	Maximum sleeping time in min.	Dose in mg	Minimum sleeping time in min.
Sodium Pentothal	4	96	4	96
Bhanga	20	85	5	40
Vacha	20	70	40	20
Jatamansi	20	75	40	10
Sarpagandha	50	73	40	20
Parsika yavani	50	77	40	18

Table 8 Maximum induction time and maximum sleeping period

Name of the Drug	Dose in mg	Maximum induction time in min.	Dose in mg	Maximum sleeping period in min.
Sodium Pentothal	4	10	4	96
Bhanga	20	10	30	85
Vacha	20	10	30	70
Jatamansi	20	20	50	75
Sarpagandha	20	20	50	75
Parsika yavani	20	10	50	77

Table 9 Comparison of the combined effect of the same drugs with sodium pentothal

Name of the Drug	Induction time in min.	Dullness time in min.	Sleeping time in min.
Distilled water	No	No	No sleep
Sodium pentothal 2mg	10	5	55
Bhanga 30mg+ Sodium pentothal 2mg	26	20	43
Vacha 30mg + Sodium pentothal 2mg	20	15	66
Jatamansi 30mg + Sodium pentothal 2mg	15	10	93

In case of Bhanga, Vacha, and Jatamansi induction time found to be increased with increasing dose except in 30mg dose group. In case of Sarpagandha and Parsik yavani extract induction time decreases with increasing doses of the drugs. In all the drugs time was found minimum in 30mg dose groups.

The average period of dullness was about 15-20 minutes up to the dose of 20mg /100gms with all the drugs while with 30mg dose this time was minimum (5-10 min). Hence with increased dose of drug there was tendency towards increased period except in case of 50mg with Sarpagendha and Parsik yavani.

The duration of sleeping period was found minimum with 40mg dose with all drugs and with 20mg dose of Bhang, Vacha or Jatamansi the duration of sleeping period was found maximum. Similar observation was noted with 50mg dose of Sarpagandha and Parsik yavani. However the duration of sleeping period does not exceed 90 minutes with any of the drugs.

Induction time after the prescribed doses was the same for Sodium pentothal, Bhanga, Vacha and Parsika yavani where as it was double with Jatamansi and Sarpagandha. In case of the duration of dullness the period was 5 minutes in the sodium pentothal, Bhanga, Vacha and Parsika yavani where as it was double with Jatamansi and Sarpagandha. There was considerable difference in the sleeping time. The sleeping time with sodium pentothal was 96 minutes while it was between 60- 70 minutes in case of other five drugs.

The dose of sodium pentothal =2mg/100gm body weight

Dose of other drugs=30mg/100gm body weight+2mg sodium pentothal

The dullness time before sleep was 5 min. with sodium pentothal, but it was increased to 10 min. in combination with Jatamansi, 15 min in combination with Bhanga. A similar effect was also seen in the case of the time required for inducing sleep. The drugs Jatamansi, Vacha and Bhanga in combination with sodium pentothal increased this time to 15, 20 and 26 min. respectively as compare to 10 min. with sodium pentothal alone. Thus it was seen that the three drugs viz. Bhang, Vacha and Jatamansi increased the action of sodium pentothal with respect to the dullness time & induction time. The effect of these drugs on the sleeping time, when used in combination with sodium pentothal is quite difference from the above results. Jatamansi when injected along with sodium pentothal increased the sleeping time was 93 minutes as compare to 55 minutes with sodium pentothal alone and Vacha increases this sleeping time slightly i. e. 66 minutes. In case of Bhang, the sleeping time is reduced and was found 43 minutes. Thus both Vacha and Jatamansi appear to potentiate the action of the sodium pentothal in respect to sleeping time. The potentiating action with Jatamansi is much greater as compare to that with Vacha. However Bhanga shows a mild depressive action in contrast to other two drugs.

No sedation or any behavioral changes were noted in the control group i.e. distillated water group. After completion of the all sets of experiment it was noted that there were no complication of death or any changes of normal behavior in the rats.

RESULTS AND DISCUSSION

The drugs Bhanga, Vacha, Jatamansi, Sarpagandha and Parsik yavani were selected for experimental study on rats. The results of first set of experiment showed the time required for the onset of sleep after injection of alcoholic extracts of each drugs were with considerable difference. The results were similar with Bhanga, Vacha and Jatamansi in the sense there was increasing effect with increasing doses. But in Sarpagandha and Parsik yavani the time required for induction of sleep after injection was longer with lower dose and shorter with higher dose. The notable point was time interval was minimum with 30mg dose of each drug.

Similar findings were found in case of the period of dullness after injection of each drug.

The duration of sleeping period was almost similar (one hour) with 30 mg dose, where as

it was maximum with lower dose in cases of Bhanga, Vacha and Jatamansi (20mg/ 100gms) and at higher dose in case of Sarpagandha and Parsik yavani (50mg/ 100gms). Thus the sleeping period with different doses did not exhibit similar trend as seen in induction and dullness period.

Comparison of 30mg dose of all drugs was made with 4mg/100gms dose of sodium pentothal. The results indicate that the time interval for induction of sleep and dullness time were almost same in Bhanga, Vacha, Parsik yavani and sodium pentothal while they were almost double with Sarpagandha and Jatamansi. The sleeping time with sodium pentothal was 11/2 times more than that obtained with all drugs. Sarpagandha and Jatamansi required longer duration for onset of sleeping as compare to other drugs, while all drugs had shorter duration of action in sleeping time as compare to sodium pentothal in 30mg doses.

Bhanga, Vacha and Jatamansi in dose of 30mg /100gm were compared with half dose (2mg/100gms) of Sodium pentothal. It was found that the three drugs potentiate the effect of sodium pentothal as far as dullness time and time required for induction of sleep were concerned. Those effects were uniform but sleeping time effect did not showed similar uniformity. Bhanga had shown slightly retarding effect, while Vacha and Jatamansi had potentiated the action of sodium pentothal. The potentiating of sleeping time with Jatamansi was very remarkable while with Vacha it was very slight.

The alcoholic extract of various herbal drugs contains various compounds with different chemical structures and different pharmacological actions for each compound. However it was quite certain that all those drugs appeared to induce sleep on injection and possess sedative action.

CONCLUSION

Bhanga Vacha and Jatamansi were increased induction time and dullness time with increasing doses while the effect was quite reverse with Sarpagandha and Parsik yavani. It was also found that the dose of 30mg /100gms of all drugs had similar effect on induction time, dullness time and sleeping time. Induction time and dullness time showed little variation where as sleeping time was less in case of herbal drugs as compared with sodium pentothal. All drugs potentiated the action of sodium pentothal to very mild extent as induction time and dullness time concerned. Bhanga reduced sleeping time of sodium pentothal while Vacha and Jatamansi potentiated the sleeping time.

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