Research Article
AMERICAN JOURNAL OF PHARMACY AND HEALTH RESEARCH
www.ajphr.com
2017, Volume 5, Issue 9
ISSN: 2321–3647(online)

Anti pyretic activity of *Swertia chirata buch-ham* (Chiraita talkh) on Albino rats (wistar strain)

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ABSTRACT

Fever (pyrexia) is defined as an elevation of core body temperature above the level normally maintained by the individual. The idea that fever is a method of therapy may be traced back to the early days of written history. **"Give me the power to produce fever, and I will cure all disease,"** is a quotation attributed to Hippocrates more than 2300 years ago. Hippocrates had ideas as to the significance of fever, and modern concepts as to its possibilities. Ruphos of Ephesus, 450 years afterwards, said: "If indeed any were so good a physician as to be able to produce fever, it would not be necessary to look for any other remedy in sickness". In Unani system of medicine several hundred of plants are used as therapeutic remedies. A large number of these medicinal plants unfortunately, have not been investigated with the help of allied science like chemistry and pharmacology. In Unani various plant drugs are used for the treatment of fever; *Swertia chirata* is one of the important drug of them mentioned as antipyretic in classical Unani text. The present study shows that methanolic extract of *Swertia chirata* (MESC) in the dose of 800 mg/kg body weight possesses a significant antipyretic effect and reducing the yeast induced elevated body temperature in Albino rats, its effect is compatible to that of standard antipyretic drug paracetamol in the dose of 200 mg/kg body weight.

Keywords: Pyrexia; Fever; Humma; Antipyretic; *wertia chirata;* Albino Rats.

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Received 08 September 2017, Accepted 20 September 2017

Please cite this article as: Ali MY *et al*., Anti pyretic activity of Swertia chirata buch-ham (Chiraita talkh) on Albino rats (wistar strain). American Journal of Pharmacy & Health Research 2017.

INTRODUCTION

In Unani system of Medicine (USM) Fever is considered as an unnatural heat that arises from the heart. According to USM, fevers are divided into three classes. Those that originate in the spirit are called ephemeral fevers; those that originate in the humors are called putrefactive fevers; and those that occur in principal organs are called hectic fevers. The plant under study is commonly known as Chiraita (*Swertia Chirata* Buch-Ham) which belongs to the family *Gentianaceae* and Genus Swertia Linn,. It is medicinal plant indigenous to temperate Himalaya. Its medicinal usage is reported in Indian pharmaceutical codex, the British and American pharmacopias and in different traditional system of medicines such as the Unani, Ayurveda and Siddha. Chiraita is well known single herbs for controlling fever; antipyretic effect (Daf-e-Humma)[1,2,3,4,5,6,7,8.] Chirata has been used in Unani system of medicine since ancient time. Yet its efficacy is not assessed on modern scientific base. Hence there was need to identify and study its pharmacological activity. In this study the said drug was found equivalent to the control drug.

Aims and Objectives

The aim of the present study is to asses anti pyretic activity of *Swertia chirata* and to compare its efficacy with paracetamol.

MATERIALS AND METHOD

Collection of test drug and preparation of extract

Dried whole plants of swertia chirata were obtained from whole sale market of Patna. The taxonomical identification of plant was done by Mr. S. Imam, Botanist, CCRIUM, Hyderabad. A sample of *Swertia chirata* was deposited in museum of department of Ilmul Advia, Govt. Nizamia Tibbi College, Hyderabad.

Preparation of Extract

The powdered plant materials were extracted using methanol as solvent in soxhlate extraction apparatus. The solvent was completely removed by using rotatory flash evaporator to get semi solid mass and remaining extract was weighed and dose was calculated. The semi solid methanolic extract of *Swertia chirata* were stored in refrigerator and a weighed quantity was suspended in propylene glycol (A demulcent agent used as a solvent for medicines and in cosmetics)

Animal used

48 Albino rats (wistar strain) of either sex having weight 150 – 200 gm were used. The animal were maintained under suitable condition with dark and light cycle (12/12 hrs) and fed with standard dry pellets, Bengal grams, wheat flour and water throughout the experiment.

Brewer's Yeast

Pyrexia was induced by subcutaneously injecting the suspension of brewer's yeast (saccharomyces cerevisiae)

Dose of yeast suspension

10 ml/kg body weight of 15% (w/v) yeast suspended in 0.5% (w/v) methyl cellulose solution, subcutaneously in the hind limb of the rats [9.]

Clinical thermometer

For measuring the rectal temperature of experimental animal

Experimental protocol

The experimental procedures were carried out in the departmental laboratory of pharmacology of Osmania Medical College. The antipyretic activity of *Swertia chirata* was evaluated in the experiments using methanolic extract and crude drug powder. In experimental protocol 48 rats were divided into eight groups of six rats each, the animals were numbered serial wise 1 to 6, group were named I to VIII. After overnight fasting (water allowed) the animal were arranged in different groups and kept in separate cages at standard experimental condition. Normal rectal temperatures of rat were recorded and its hourly variation was noted for a period of four hours. The anti pyretic activity of *Swertia chirata* was evaluated by method described by Smith and Hambourger 1935. After measuring the basal rectal temperature animal were given a subcutaneous injection of 10 ml/kg body weight of 15% (w/v) yeast suspension in 0.5% (w/v) methyl cellulose solution. Rats were then returned to their housing cage. After 18 hours of yeast injection the animals were again restrained in individual cages for the recording of their rectal temperature. Due care was taken while recording the temperature by inserting the thermometer 2-3 cm in rectum and kept therefore one and half to 2 minutes before being taken out and temperature recorded. Six animals each were arranged to various groups randomly and accordingly drugs administered as follow:

Group – I (Control Group):

The animals in this group made Hyperthermic by subcutaneous injection of yeast given normal saline 0.3 ml orally.

Group – II (Standard Group):

The animals were first made Hyperthermic by subcutaneous injection of yeast and after 18 hours given paracetamol 200 ml/kg body weight orally as a standard drug.

Group – III (Test group A):

The Hyperthermic animals in this group were subject to the administration of methamolic extract of *Swertia chirata* (MESC) in the dose of 200 mg/kg body weight orally.

Group – VI (Test group A):

The Hyperthermic animals in this group received MESC in the dose of 400 mg/kg body weight orally.

Group – V (Test group A):

The Hyperthermic animals in this group received MESC was administered orally as a test drug in the dose of 800 mg/kg body weight.

Group – VI (Test group B):

The animals in this group were first made Hyperthermic by subcutaneous injection of yeast and after 18 hours given crude powder of *Swertia chirata* (CPSC), suspended in distilled water in the dose of 200 mg/kg body weight orally as a test drug.

Group – VII (Test group B):

The Hyperthermic animals in this group received CPSC, suspended in distilled water in the dose of 400 mg/kg body weight orally as a test drug.

Group – VIII (Test group B):

The Hyperthermic animals in this group received CPSC, suspended in distilled water in the dose of 800 mg/kg body weight orally as a test drug.

For determination of antipyresis in the rectal temperature of the animals in different groups was recorded periodically for 24 hours with clinical thermometer at the intervals of 1, 2, 3 and 4 hours after normal saline / standard drug / test drug, extract or powder of *Swertia chirata* administration.

RESULTS AND DISCUSSION

The antipyretic activity of methanolic extract and crude powder of *Swertia chirata* evaluated against yeast induced pyrexia described by P K Smith & W.E. Hambourger (1935).

Albino rats of either sex having body weight 150 – 200 gm were used in experiment. The animal kept in the animal house of Osmania Medical College Hyderabad, and maintained on balanced ration (Bengal grams, standard dry pellets and wheat flour) with free access to clear drinking water. After overnight fasting of animals they were arranged in eight groups of six animals each

and animals were numbered serial wise 1 to 6 and each group were named I to VIII, to ensure the identification. Each group of animal kept in separate cage. Normal body temperature of all animals varies from 98.2^{o} F to 100^{o} F and mean normal temperature was 99.3^{o} F. After 18 hours of Brewer's Yeast suspension subcutaneously in hind limb, after 18 hours all animals got rectal temperature more than 101.2^{o} F, varies up to 103.2^{o} F and after yeast mean rectal temperature was 102.3^{o} F.

Group I (control), in this group rectal temperature had continuously raised and not returned to back to normal at the interval of 1, 2, 3 and 4 hours after administration of normal saline 0.3 ml orally.

Group II (standard group). In this group mean rectal temperature of animal after yeast induced was 102.63^{o} F. After treatment with paracetamol 200 mg/kg body weight orally start reducing body temperature and mean pyrexia was recorded at 1h, 2h, 3h and 4h as 101.3^{o} F, 101.1^{o} F, 100.7^{o} F and 99.16^{o}F respectively and at the end of 4th hour temperature came to normal. (See graph 1).

Group III (Test group A). In this group Hyperthermic animals received MESC in the dose of 200 mg/kg of body weight orally. The animal were made Hyperthermic by yeast, after 18 hours mean rectal temperature was 102.8^{o}F and after treatment with 200 mg/kg body weight of MESC mean rectal temperature was recorded at 1h, 2h, 3h and 4 hour as 102.73^{o}F, 102.5^{o}F, 102.43^{o}F, 102.2^{o}F respectively. The results have shown no significant antipyretic activity of MESC 200 mg/kg of body weight. *(See table 1, graph 1)*

Table 1: Comparative study of Antipyretic activity of Methanolic Extract of *Swertia Chirata* (MESC) and Crude Powder of *Swertia Chirata* (CPSC) on yeast induced pyrexia in albino rats

Group No.	Drug	Dose mg/kg Oral	Before yeast Normal Body temperature (^{o}F) Mean	After yeast Pyretic Temperature (^{o}F) & before drug administration Mean	Rectal temperature (^{o}F) after drug administration mean			
					1st hour	2nd hour	3rd hour	4th hour
I, Control	Normal saline	0.3 ml	98.76	102.60	102.70	102.50	102.40	102.10
II, Standard	Paracetamol	200	99.10	102.63	101.30	101.10	100.70	99.16
III, Test group A	MESC	200	99.36	102.80	102.73	102.50	102.43	102.20
IV, Test group A	MESC	400	99.60	102.60	102.40	101.93	101.76	100.76
V, Test group A	MESC	800	99.50	102.36	101.83	101.23	100.83	100.16
VI, Test group B	CPSC	200	99.30	102.10	101.93	101.73	101.50	101.20
VII, Test group B	CPSC	400	99.46	102.00	101.60	101.40	101.00	100.60
VIII, Test group B	CPSC	800	99.63	102.10	101.70	101.16	100.86	100.53

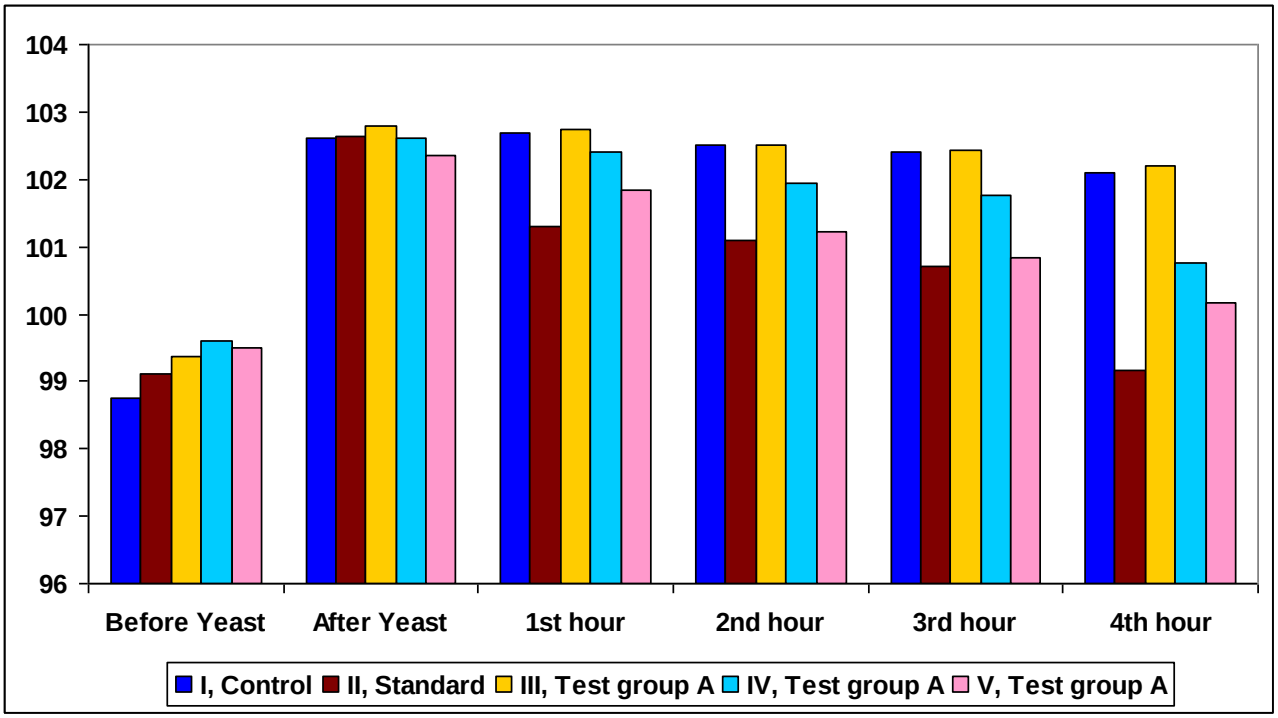
Group IV (Test group A). In this group Hyperthermic animals received MESC in the dose of 400 mg/kg body weight orally. The animal were Hyperthermic subcutaneous injection of yeast, after 18 hours mean rectal temperature was 102.6^{o}F, test drug MESC in the dose of 400 gm/kg body weight were administered and mean rectal temperature was recorded at 1h, 2h, 3h and 4th hour as 102.4^{o}F, 101.93^{o}F, 101.76^{o}F and 100.76^{o}F respectively, MESC 400 gm/kg body weight did not show normal temperature, but near to normal at 4th hours after treatment i.e., 100.76^{o}F.

Group V (Test group A). In this group Hyperthermic animal were received test drug MESC in maximum dose 800 ml/kg body weight reduced mean rectal temperature varies from 102.36^{o}F to 101.83^{o}F in 1st hour, 101.23^{o}F in 2nd hour, 100.83^{o}F in 3rd hour and 100.16^{o}F in 4th hour. On comparison with group II the result showed that MESC 800 mg/kg body weight was significant temperature changes in end of 4th hour in experimental animal. *(See graph 1)*

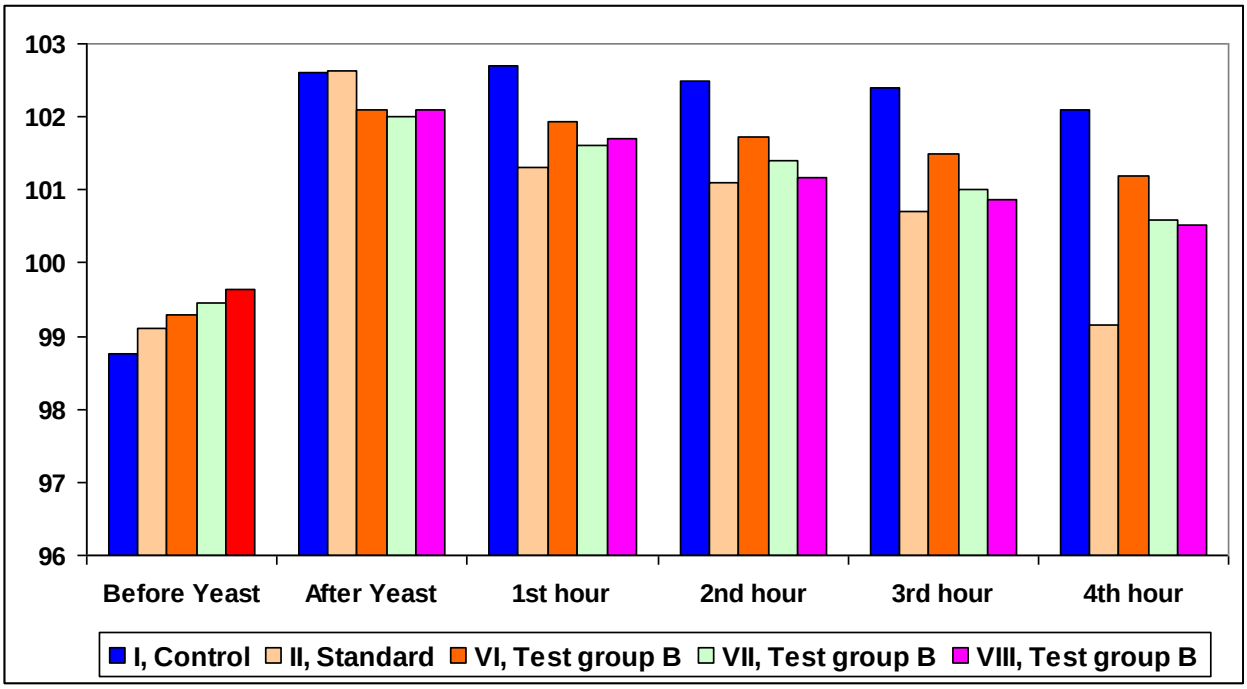
Group VI (Test group B). In this test group animal were received CPSC in the dose of 200 mg/kg body weight orally before treatment mean rectal temperature of Hyperthermic animal was 102.1^{o}F, after treatment with CPSC mean rectal temperature was recorded at 1h, 2h, 3h and 4th hour as 101.93^{o}F, 101.73^{o}F, 101.5^{o}F and 101.2^{o}F respectively. The results have shown no significant antipyretic activity of CPSC 200 gm/kg body weight. *(See table 1)*

Group VII (Test group B). In this group Hyperthermic animal were received test drug crude powder of swertia chirata CPSC in the dose of 400 mg/kg body weight before treatment mean rectal temperature was 102^{o}F and after treatment with CPSC mean rectal temperature was recorded at 1h, 2h, 3h and 4th hour as 101.6^{o}F, 101.4^{o}F, 101^{o}F and 100.6^{o}F respectively.

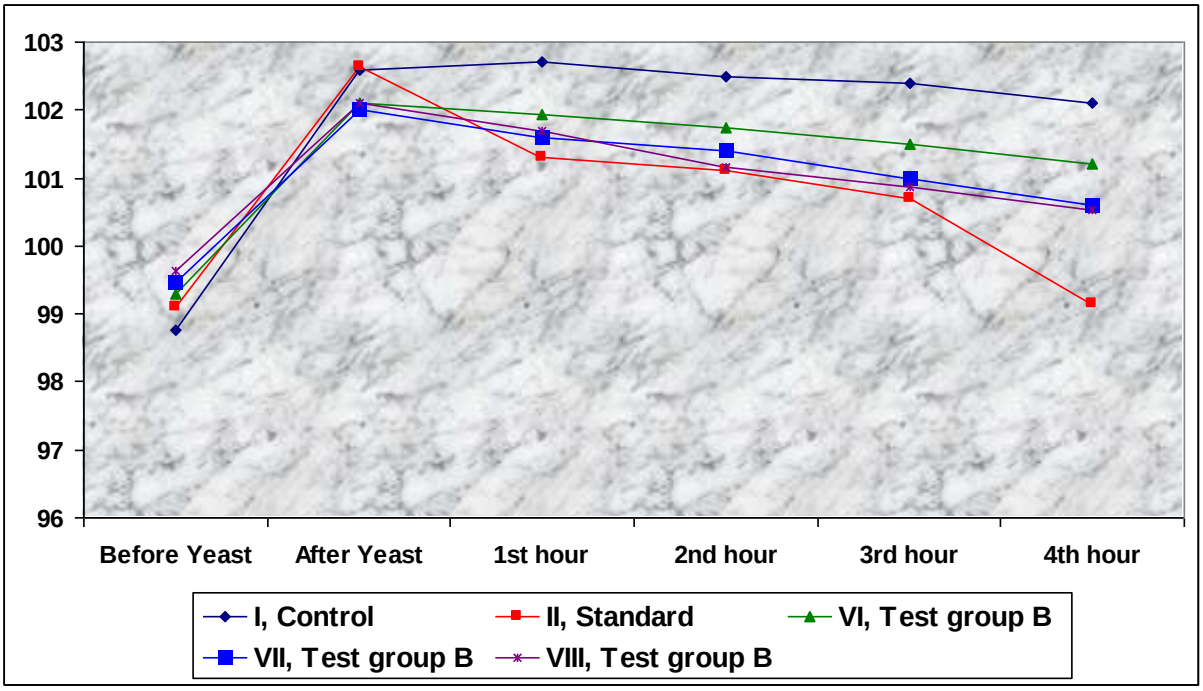
Group VIII (Test group B). In this group Hyperthermic animal were received test drug CPSC in maximum dose 800 mg/kg body weight reduced mean rectal temperature from 102.1^{o}F to 100.53^{o}F, in first hour 101.7^{o}F, in 2nd hour 101.16^{o}F, in 3rd hour, 100.86^{o}F and in 4th hour 100.53^{o}F, after comparison with group II it was not much reduced. There body temperatures not return back to below 100^{o}F till the end of 4th hour. *(See Graph 2 & 3)*



Graph*: 1* Effect of Methanolic Extract of *Swertia Chirata* (MESC) and Paracetamol on Hyperthermic albino rat.



Graph 2: Effect of Crude Powder of *Swertia Chirata* CPSC) and Paracetamol on Hyperthermic albino rat



Graph 3 : Changes in body temperature of Hyperthermic albo rats treated with test group B Crude Powder of *Swertia Chirata* (CPSC) and paracetamol

DISCUSSION

The present study is aimed to evaluate its anti pyretic activity of *Swertia chirata* Buch ham (Chiraita talkh) by using its methanolic extract (MESC) and whole plant crude powder of swertia chirata (CPSC) in Hyperthermic wistar strain albino rats. 48 pyrexia induced animal that got rectal temperature 101.2^{o}F to 103.2^{o}F were selected for study and divided in 8 group of 6 animals in each.

Group I was control group showed continuous elevated temperature, did not returned to below 102^{o}F till the whole study period. All animals were compared with this group and with their normal body temperature recorded before study started.

Group II (standard group) received standard drug paracetamol, after treatment start significant fall in rectal temperature in first hour and at 4th hour temperature came to the normal it was the best result obtained when compared with other groups.

Group III, IV, V which was the considered at test group A in this group all animals was received MESC showed changes in their rectal temperature but group V received maximum dose of MESC showed significant temperature fall when compared with standard group as it came near to the normal at the end of 4th hour but onset of action seen somewhat slow.

Group VI, VII, VIII which was considered as test group B in this group all animal received CPSC. The result showed reduction in rectal temperature but group VIII received maximum dose of CPSC. Good response from the observation in present study, the mean temperature of different animal group revealed that group V administered maximum dose of test drug have shown significant anti pyretic activity at the end of 4^{th} hour. Onset of action was comparatively slow.

CONCLUSION

The animal treated with MESC showed a significant antipyretic effect at the end of 3^{rd} and 4^{th} hour in test group V A. Animals II, III and IV groups A fail to produce any significant anti pyretic activity. The antipyretic effect produced by *Swertia chirata* has been shown to be more or less equal to the anti pyretic effect produced by standard drug. It was evident from this study that MESC exhibited a significant antipyretic activity and reducing yeast induced elevated body temperature. Further study should be conducted to evaluate the any toxicity of *Swertia chirata.*

SUMMARY

The present research study was undertaken to establish antipyretic study of *Swertia Chirata* Buch-Ham in albino rats. Pyrexia was induced in animals by subcutaneous injection of Brewer's Yeast. After 18 hours rectal temperature varies up to 103.2^{o}F. For the comparative study of antipyretic activity of methanolic extract and crude powder of Swertia Chirata, paracetamol was given to animal, as standard drug. After treatment with test drug (MESC, CPSC) and standard drug rectal temperature was recorded 1, 2, 3 & 4^{th} hour interval.

On analysis of mean rectal temperature data it was observed that MESC administered to animals in different animal group has shown a significant antipyretic effect in maximum dose at the end of 4^{th} hours in group V(A), animals in II, III, IV group fail to produce any significant antipyretic activity. In the test group VI, VII, VIII (B) administered CPSC fail to exhibit any significant antipyretic activity and rectal temperature was not come to the normal.

The present research study shows that MESC in the dose of 800 mg/kg body weight possesses a significant antipyretic effect and reducing the yeast induced elevated body temperature in albino rats, its effect is compatible to that of standard antipyretic drug paracetamol in the dose of 200 mg/kg body weight.

ACKNOWLEDGEMENT

Author pay sincere thanks to all the body and persons involved in this entire marathon process of research like Head of the institute, member of Animal ethical committee, lab boys & technicians,

the authors and writers whose reference has been cited in this article, the librarian and the colleagues.

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