Journal of Pharmacy and Alternative Medicine
ISSN 2222-5668 (Paper) ISSN 2222-4807 (Online)
Vol. 3, No. 2, 2014

Research Article

Evaluation and comparison: antipyretic activity in compound products of herbal pharmaceutical industries

Mahmood Ahmad[1], Muhammad Usman Naeem[1], Muhammad Naeem Aamir[2]

[1]Faculty of Pharmacy & Alternative Medicine, the Islamia University of Bahawalpur, Pakistan

[2]Faculty of Pharmaceutical Sciences, G.C. University, Faisalabad, Pakistan

*E-mail of the corresponding author: naeem.aamir@gcuf.edu.pk

Accepted Date: 26 May 2014

To reduce an elevated body temperature various antipyretics drugs and medicinal plants are used. This study was designed to evaluate the antipyretic claim compound herbal syrups manufactured by three different herbal pharmaceutical companies of Pakistan. Bukharin (Hamdard Laboratories), Fever-X (Qarshi Industries) and Bukharok (Ashraf Laboratories) products were tested in rabbits. The experimental conditions were produced by E. coli suspension in animal model whereas 150 mg/Kg Paracetamol suspension was used as positive control. Doses with concentration of 5 ml/Kg of syrup were administered to check temperature lowering effect. The administration of Bukharin, Fever-X and Bukhrok significantly reduced the rectal temperature of animals. It was concluded that Bukharok and Bukharin syrups are good antipyretic drug products as they lowered 3 and 2.5 ˚C temperature respectively.

Keywords: Antipyretic effect, Herbal Syrups, Comparison with Allopathic Medicine

1. INTRODUCTION

Different plants have been used to cure same or several diseases at a time. Towards the middle of 20th century the contribution of medicinal plants was reduced by one-fourth as the research and development in favor of synthetic chemicals outclassed them to a great extent. Now, this trend is reversing again in favor of plans as the latter, being natural products, have been discovered to possess more balanced, effective least injurious with none or much reduced side effects.

Large numbers of medicinal plants have been evaluated for their potential against various ailments including fever. The organic extract of *Cissampelos pareira* (Hullatti and Sharada, 2007), *Sargassum fulvellum* (Kanget al., 2008), *Zizyphus oxyphylla* (Nisar et al., 2007), *Eclipta prostrate* (Mazumder et al., 2006), *Caesalpinia bonduecella* (Archana et al., 2005), *Strobilanthes cusia* (Ho et al., 2003), *Premna herbace* (Narayanan et al., 2000), *Litchi chinensis* (Besra et al., 1996) and so many other plants have been tested and found effective in reducing pyrexia. It is evident that antipyretic activity of extracts of crude drugs has been studied extensively but limited research has been conducted on finished herbal products. In present study most frequently prescribed antipyretic herbal products by "Homoeopathic Doctor" "Hakim/Tabib" were selected to determine antipyretic activity, and to compare their antipyretic potential.

2. MATERIALS AND METHODS

2.1 Chemicals

Normal saline (Siza International Pakistan), MacConkey's agar (Merck Germany), Nutrient broth (Merck Germany) and Distilled water (The Islamia University of Bahawalpur)

2.2 Animal selection and ethical approval

Adult healthy male and female rabbits of local strain *Oryctolagus cuniculus* were selected. The weight of rabbit ranged between 1-1.2 Kg. They were kept n air conditioned animal house and were fed green fodder bread, maize and tap water. The animals were acclimatized in an environment of controlled temperature 22-25 °C and light /dark cycle 12 h each for one week prior the study. The ethics of this study were approved by the Pharmacy Research Ethics Committee, The Islamia University of Bahawalpur, Pakistan (Ref No. 31-2012/PREC dated April 10, 2012).

2.3 Preparation of E. coli suspension

The pure and identified culture of E. coli were obtained on MacConkeys agar from Microbiology laboratory of Quid-e-Azam Medical College Bahawalpur and incubated for 24 h. The colonies were counted under colony counter. One colony was picked and washed in normal saline and spread on agar plate for reculture and incubated for 24 h. The culture was washed with normal saline and then cultured in nutrient broth by incubating for 24 h. A tenfold dilution of the suspended broth culture was prepared with normal saline. The total number of organisms was calculated by multiplying the number of organism in one drop to the number of drops in one ml. Total number of E.coli in 1 mml was $127x10^7$.

2.4 Induction of pyrexia in rabbits

Fever was produced in rabbits by injection of E. coli suspension in the marginal ear vein of rabbit at a concentration of 0.01 ml per Kg body weight (Elmas et al., 2006). Rectal temperature was recorded before and after injection at regular interval during experiment. The pyrexia was produced after injecting 1-2 hrs of E. coli.

2.5 Drug administration

In Pakistan, a number of herbal companies are manufacturing antipyretic products. Three herbal product, Bukharin (Hamdard Laboratories), Fever-X (Qarshi Industries) and Bukharok (Ashraf Laboratories) were selected. The syrup of Bukharin, Fever-X and Bukharok were administered at dose of 5 ml/Kg and 7 ml/Kg to the treatment groups of rabbits. A group of five rabbits was used for evaluation of each dose of a product. Two more groups, one negative control (E. coli suspension) and one positive (Paracetamol suspension, 150mg/Kg), were also studied parallel to test groups.

2.6 Statistical analysis

The results were evaluated using one-way Analysis of Variance (ANOVA) test between two mean control and test groups followed by students t-test. Significant level was taken at $p< 0.05$ (Arul et al, 2005).

3. RESULTS

In rabbits the initial rectal temperature 99.9±0.139

°F and increased to 104.2±0.144 °F after 1 hr of E. coli injection. In subsequent two hrs observed rectal temperature was 104±0.087 °F and 103.8±0.792 °F. In positive group the rectal temperature after I, 2, 3 and 4 hr was 104.2±0.162, 103.7±0.156, 102.2±0.185 and 100.4±0.196 °F followed by initial 100.4±0.271 °F. In the group of rabbits given Bukharin, the decline in temperature ranged from 104.1±0.169 to 101.6±0.139 °F over the period of three hour after drug administration. In rabbits group treated with Fever-X initially the temperature was 101.7±0.434 °F and it increased to 103.5±0.287 °F after I hr of E. coli injection. Administration of Fever-X reduced the rectal temperature to 101.4±0.36 °F in next three hours. In final group treated with Bukharok the rectal temperature before E. coli injection was 99.7±0.472 °F with raise in 4 degree in first hour. Bukharok administration reduced the temperature to 102.4±0.499, 101.8±0.142 and 100.2±0.178 °F in 2nd, 3rd and 4th hour of study (Figure 1).

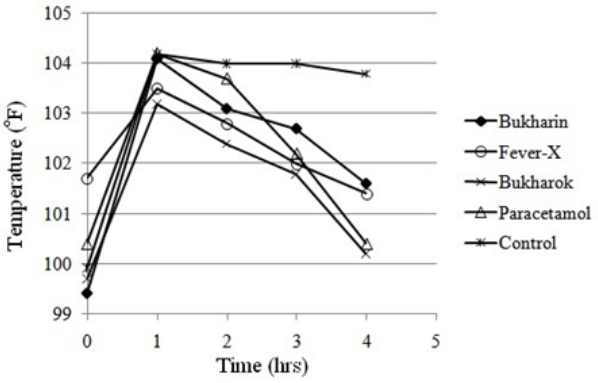

Figure 1: Comparison of temperature change before and after administration of herbal products

4. DISCUSSION

Infection, tissue damage, inflammation or other pathological condition may result in fever. In fever set point in hypothalamus is elevated and to reduce an elevated body temperature various antipyretics drugs and medicinal plants are used. Bacteria-induced pyrexia involved production of prostaglandins. Most of the antipyretic drugs inhibit prostaglandin biosynthesis by inhibiting COX-2 which is mediator of fever production in body (Arokiyaraj et al., 2008).

Bukharin syrup is a compound preparation and its antipyretic activity is because of *Azadirachta indica*, *Achillea milefolium* (El-Sadek et al., 2007), *Atemisia absinthium*, *Aconitum herterophyllum* (Santosh et al., 2010), *Adhatoda vasika* (Wahid et al., 2010), *Bambusa arundinacea*, *Cuscuta reflexa* (Sanjib and Bodhisattva, 2010), *Foeniculum vulgare* (Choi and Hwang, 2004), *Glycyrrhiza glabra* (Vijay et al., 2011), *Tinospora cordifolia* (Singla, 2010), *Fumaria officinalis*. In addition to these antipyretic drugs

Bukharin syrup also contains three antibacterial activity herbs i.e. *Berberis lyceum* (Altaf et al., 2011), *Nymphaea lotus* (Akinjogunla et al., 2009) and *Sisymbrium irio*.

Medicinal plants in Fever-X syrup that have antipyretic activity include *Melia azadirachta*, *Swertia chirata* (Sushil et al., 2009), *Solamum nigrum* (Zakaria et al., 2009), *Glycyrrhiza glabra* (Shahid et al., 2009), *Tinospora cordifolia* (Singla, 2010) and *Fumaria officinalis*. Whereas, *Sisymbrium irio* has shown antibacterial activity.

Bukharok syrup exhibited good antipyretic effects because it also contained five antipyretic herbal drugs; *Glycyrrhiza glabra* (Vijay et al., 2011), *Tinospora cordifolia* (Singla, 2010) *Fumaria officinalis*, *Azadirachta indica* and *Berberis aristata* (Shahid et al., 2009). Antibacterial activity of *Cichorium intybus* and *Pterocarpus santalinus* (Nandagopal and Ranjitha, 2007; Manjunatha, 2006) also facilitated the reduction in pyrexia.

The phyto-chemicals in these products, such as flavnoids, steroids, glycosides, saponins alkaloids and anthroquinones, have been reported as good antipyretic in various studies. Therefore, the effectiveness of herbal syrups may be due to availability of such photochemical constituents which caused an inhibitory effect on prostaglandin biosynthesis in the central nervous system (Reanmongkol et al., 2007; Ebrahimzadeh et al., 2006; Math et al., 2011).

4. CONCLUSION

The selected herbal products, Bukharine, Fever-X and Bukhrok, possess significant antipyretic activity. Both Bukharok and Bukharin syrups are good antipyretic drug products and are effective to treat pyrexia as they can reduce the elevated temperature normal within 3 hours. The study also confirmed the claim of herbal pharmaceutical companies about their medicines.

Conflict of Interests

Authors declared no competitive interests for the presented work.

References

Akinjogunla OJ, Adegoke AA, Udokang IP, Adebayo-Tayo BC (2009). Antimicrobial potential of Nymphaea lotus (Nymphaeaceae) against wound pathogens. Journal of Medicinal Plants Research, 3: 138-141.

Altaf MH, Qayyum MK, Tariq H, Nazar H (2011). Antimicronbial Activity of the Crude Root Extract of Berberis Lycium Royle. Advances in Environmental Biology. Advances in Environmental Research, 5: 585-588.

Archana P, Tandan SK, Chandra S, Lal J (2005). Antipyretic and analgesic activities of Caesalpinia bonducella seed kernel extract. Phytotherapy Research, 19: 376-81.

Arokiyaraj S, Martin S, Perinbam K, Marie Arockianathan P, Beatrice V (2008). Free radical scavenging activity and HPTLC finger print of Pterocarpus santalinus L. – an in vitro study. Indian Journal of Science and Technology, 1:7.

Arul V, Miyazaki S, Dhananjayan R (2005). Studies on the anti-inflammatory, antipyretic and analgesic properties of the leaves of Aegle marmelos Corr. Journal of Ethnopharmacology, 96: 159-163.

Besra SE, Sharma RM, Gomes A (1996). Antiinflammatory effect of petroleum ether extract of leaves of Litchi chinensis Gaertn. (Sapindaceae). Journal of Ethnopharmacology, 54: 1-6.

Choi EM, Hwang JK (2004). Antiinflammatory, analgesic and antioxidant activities of the fruit of Foeniculum vulgare. Fitoterapia, 75: 557-65.

Ebrahimzadeh MA, Mahmoudi M, Salimi E (2006). Antiinflammatory activity of sambucus ebulus hexane extracts. Fitoterapia, 77: 146-148.

Elmas M, Yazar E, Uney K and Karabacak EA (2006). Antiinflammatory effect of petroleum ether extract of leaves of Litchi chinensis Gaertn. (Sapindaceae). Journal of veterinary medicine. A, Physiology, pathology, clinical medicine, 53: 410-4.

El-Sadek SE, El-Gendy AAM, Tohamy MA, Abd El-Aa MA (2007). Anti-inflammatory, antipyretic and analgesic effect of Achillea millefolium and Salix plants. BS. Veterinary Medical Journal, 17: 86-92.

Ho YL, Kao KC, Tsai HY, Chueh FY, Chang YS (2003). Evaluation of antinociceptive, anti-inflammatory and antipyretic effects of Strobilanthes cusia leaf extract in male mice and rats. The American Journal of Chinese Medicine, 31: 61-9.

Hullatti KK, Sharada MS (2007). Comparative Antipyretic activity of Patha: An Ayurvedic drug. Pharmacognosy Magazine, 3: 173-176.

Kang JY, Khan MNA, Park NH, Cho JY, Lee MC, Fujii H, Hong YK (2008). Antipyretic, analgesic, and anti-inflammatory activities of the seaweed Sargassum fulvellum and Sargassum thunbergii in mice. Journal of Ethnopharmacology, 116: 187-190.

Manjunatha BK (2006). Antibacterial activity of

Pterocarpus santalinus. Indian Journal of Pharmaceutical Sciences, 68: 115-6.

Math P, Mishra DK, Prajapati PK, Roshy J, Jha PK (2011). Anti-Pyretic Activity of Madhukadi Kwatha and Madhukadi Ghana - An Experimental Study. International Journal of Pharmaceutical and Biological Archive, 2: 572-576.

Mazumder A, Sahay J, Mazumder R (2006). Evaluation of antipyretic potential of Eclipta prostrata Linn. leaf extract in rats. The Ethiopian Pharmaceutical Journal, 24: 71-73.

Nandagopal S, Ranjitha K (2007). Phytochemical and Antibacterial Studies of Chicory (Cichorium intybus L.) - A Multipurpose Medicinal Plant. Advances in Bioresearch, 1: 17-21.

Narayanan N, Thirugnanasambantham P, Viswanathan S, Kannappa RM, Vijayasekaran V, Sukumar E (2000). Antipyretic, antinociceptive and anti-inflammatory activity of Premna herbacea roots. Fitoterapia, 71: 147-53.

Nisar M, Adzu B, Inamullah K, Bashir A, Ihsan A, Gilani AH (2007). Antinociceptive and antipyretic activities of the Zizyphus oxyphylla leaves. Phytotherapy Research, 21: 693–695.

Reanmongkol W, Itharat A, Bouking P (2007). Evaluation of the anti-inflammatory, antinociceptive and antipyretic activities of the extracts from Smilax corbularia Kunth rhizomes in mice and rats (in vivo). The Songklanakarin Journal of Science and Technology, 29: 59-67.

Sanjib B, Bodhisattva R (2010). Preliminary investigation on antipyretic activity of cuscuta reflexa in rats. Journal of Advanced Pharmaceutical Technology & Research, 1(1): 83-87.

Santosh V, Shreesh O, Mohammad R (2010). Anti-inflammatory activity of Aconitum heterophyllum on cotton pellet-induced granuloma in rats. Journal of Medicinal Plants Research, 4: 1566-1569.

Shahid M, Rahim T, Shahzad AT, Latif A, Fatima T, Rashid M, Adil R, Mustafa S (2009). Ethnobotanical studies on Berberis aristata DC. Root Extracts. African Journal of Biotechnology, 8: 556-563.

Singla A (2010). Review of Biological Activities of “Tinospora Cordifolia". WebmedCentral, Pharmaceutical Sciences, 1:9.

Sushil B, Prakash SR, Paridhi B, Shivshankar S (2009). Antipyretic Potential of Swertia chirata Buch Ham. Root Extract. Scientia Pharmaceutica, 77: 617-623.

Vijay SJ, Santosh KS, Pankaj K, Ashish KS (2011). Recent Pharmacological Trends of Glycyrrhiza glabra Linn. International Journal of Pharmaceutical Frontier Research, 1: 170- 185.

Wahid AM, Suyog DM, Suraj BJ, Ajinkya MP, Mukhtar SK, Madhukar RV (2010). Evaluation of antiinflammatory and analgesic activities of ethanolic extract of roots Adhatoda vasica Linn. International Journal of PharmTech Research, 2: 1364-1368.

Zakaria ZA, Sulaiman MR, Morsid NA, Aris A, Zainal H, Pojan NH, Kumar GH (2009). Antinociceptive, anti-inflammatory and antipyretic effects of Solanum nigrum aqueous extract in animal models. Methods & Findings in Experimental & Clinical Pharmacology, 31: 81-8.

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
http://www.iiste.org

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: http://www.iiste.org/journals/ All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: http://www.iiste.org/book/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar