

Evaluation of antibacterial and antioxidant potential of some homoeopathic mother tinctures

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Abstract

Objectives: In homoeopathic system of medicine, mother tinctures are prescribed for several diseases especially for septic conditions and cure of many illnesses. This study was done to evaluate the antibacterial and antioxidant potential of ten commonly used homoeopathic mother tinctures. **Materials and Methods:** Ten prepared mother tinctures were tested against five clinically important human pathogenic bacteria (*Salmonella typhi* [S.T], *Escherichia coli* [E.C], *Bacillus subtilis* [B.S], *Staphylococcus aureus* [S.A], and *Pseudomonas aeruginosa* [P.A]) by broth micro-dilution method with ciprofloxacin as positive control. Antioxidant activity was estimated by 2,2-diphenyl 1-picryl hydrazyl (DPPH) inhibition assay. Ascorbic acid was taken as positive standard in antioxidant activity. **Results:** All mother tinctures showed more or less antibacterial activity. *Cinchona officinalis* had maximum activity (89% inhibition) against *Salmonella typhi* than all the tested mother tinctures. *Pulsatilla nigricans* showed the highest inhibition of DPPH (85%) among other tested plant mother tinctures. **Conclusion:** This study reveals that the above-tested mother tincture has antibacterial and antioxidant potential against the particular microorganism and 2,2-diphenyl 1-picrylhydrazyl (DPH), respectively.

Keywords: Antibacterial, Antioxidant, Homoeopathic mother tinctures

INTRODUCTION

In Homoeopathy, mother tinctures are used for different types of infections including skin infections, wound infections and chronic ulcerative conditions. Some are used as topical antiseptics.^[1] Moreover, various homoeopathic mother tinctures have antioxidant potential and are being used for the treatment of degenerative diseases.^[2] Homoeopathic mother tinctures of plant origin are the hydroalcoholic extracts of medicinal plants, with some difference of ratio of alcohol and medicinal plants. The extracts of plant source contain secondary metabolites including glycosides, polyphenols, flavonoids, saponins, alkaloids and various others. They can significantly produce antioxidant, antimicrobial, antihypertensive, anti-diabetic, anti-inflammatory, antipyretic and various other therapeutic effects.^[3]

Different methods can be used to assess antioxidant activity of a compound. However, the use of free radical 2,2-diphenyl 1-picryl hydrazyl (DPPH) is the preferred method to measure antioxidant activity as it is a simple and rapid method. Moreover, it is not specific for particular antioxidant component, thus measuring the total antioxidant capacity of

sample. DPPH-free radical contains an odd electron and is purple. The colour changes from purple to yellow when the odd electron of DPPH radical combines with hydrogen from a free radical scavenging antioxidant to form the reduced DPPH-H.^[2]

Different methods can be used to assess the antibacterial activity of a compound. Agar well/disk diffusion assays are the antibacterial methods that estimate antibacterial potential of a sample qualitatively with zone of inhibitions.^[4] However, broth micro-dilution assay is the quantitative antibacterial susceptibility testing method that gives the percentage inhibition of bacteria in a micro-well.^[5]

All the selected mother tinctures are conventionally used for the treatment of various types of diseases including infections, e.g., *Pulsatilla nigricans* belongs to *Ranunculaceae* family and it

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is well-known remedy for the treatment of anxiety, melancholy, mild restlessness and mental disturbance. Ovaritis, ovarialgia, pain due to acute inflammation, epididymitis, orchitis, uterine affections, indigestion, coryza, otitis, rhinitis, conjunctivitis, cough, cutaneous affections and acute meningitis are treated by *Pulsatilla nigricans*. Its roots are reported as antibacterial, anti-amoebic, antitumor, blood-cooling and detoxifier.^[6] *Thuja occidentalis* belongs to *Cupressaceae* family. It helps avoid surgical intervention in cases of papilloma, epithelioma, polyps, pustules, ulcers and skin eruptions. In different research studies, *Thuja occidentalis* has been proved as antimicrobial against multiple pathogens.^[7] *Atropa belladonna* belongs to *Solanaceae* family and is used for teething complaints, fever and different types of inflammatory conditions. *Nux vomica* belongs to *Loganiaceae* family and is used for various types of gastrointestinal diseases due to sedentary life style. *Achillea millefolium* belongs to the family *Asteraceae* and is useful for haematuria, dentition, chlorosis and leucorrhoea. *Cinchona officinalis* belongs to *Rubiaceae* family and is used for parasitic infections, diarrhoea and bloating conditions. *Allium sativum* belongs to *Amaryllidaceae* family and is used for colitis and various types of cardiovascular diseases.^[8] *Hamamelis virginiana* belongs to *Hamamelidaceae* family and is useful for the treatment of inflammatory disorders and tumours.^[9] *Rhus toxicodendron* belongs to *Anacardiaceae* family and treats skin ailments such as fever blisters, chicken pox and shingles hives. *Berberis vulgaris* belongs to *Berberidaceae* family and is used for the treatment of fever, cough, liver diseases and kidney diseases. *Matricaria chamomilla* belongs to *Asteraceae* family and is useful for the treatment of to cure digestive disorders, inflammatory disorders and anger related problems.^[8]

The aim of the current study was to evaluate ten above-mentioned homoeopathic mother tinctures for their antioxidant and antibacterial properties. In literature review, no study has reported antioxidant and quantitative antibacterial potential of these homoeopathic mother tinctures.

MATERIALS AND METHODS

Chemicals and bacterial strains

DPPH, ascorbic acid and ciprofloxacin (Sigma-Aldrich, Germany) were used. *Staphylococcus aureus* (S.A) ATCC-6538 and *Pseudomonas aeruginosa* (P.A) ATCC-9027 were purchased from Microbiologies Inc. *Bacillus subtilis* (B.S), *Salmonella typhi* (S.T) and *Escherichia coli* (E.C) were purchased from first Fungal Culture Bank of Pakistan, Institute of Agricultural Sciences, University of Punjab, Lahore, Pakistan. Accession numbers were 12, 14 and 72, respectively.

Plant material

Plant parts were purchased from herbalist in local market. Ten plants were tested: (1) *Cinchona officinalis* bark, (2) *Allium sativum* fruit, (3) *Strychnos nux-vomica* seeds, (4) *Pulsatilla nigricans* whole plant, (5) *Atropa belladonna*, (6) *Hamamelis virginiana*, (7) *Rhus toxicodendron* leaves and twigs, (8) *Berberis vulgaris*, (9) *Matricaria chamomilla*, (10) *Thuja occidentalis* leaves and twigs and (11) *Achillea*

millefolium whole fresh plant. The plants were identified by the botanist, Dr Sarwar, Lecturer, The Islamia University, Bahawalpur (Voucher No. 2201/L.S–2203/L.S, 2206/L.S–2212/L.S, respectively) and were deposited to IUB Herbarium.

Preparation of mother tinctures

100 g of each plant material in the powder form was placed in a flask of 2 L capacity for soaking in 900 mL of 70% ethanol for 15 days. The flask was kept in dark cool place after sealing and shaken for 10 min daily. After that, the material was filtered by coarse filtration through multiple layers of muslin cloth and then filtered by a filter paper. The filtrate was taken in glass bottles, sealed and stored in dark cool place.^[10,11]

Antioxidant activity

DPPH-free radical scavenging test was used for assessing antioxidant activity of homoeopathic mother tinctures.

2,2-diphenyl 1-picryl hydrazyl-free radical scavenging test

There are multiple methods for the evaluation of antioxidant activity, but DPPH-free radical scavenging method was the preferred one because it could conduct easily as it is stable, rapid and less expensive.^[12]

Method of 2,2-diphenyl 1-picryl hydrazyl inhibition assay

DPPH inhibition assay was performed as mentioned by Mel *et al.*^[13] with some adjustment. The concentration of DPPH 100 μ M in methanol was used. Total assay volume was 100 μ L containing 10 μ L of the test solution and 90 μ L of DPPH solution in a 96-well plate. The contents were mixed and incubated at 37°C for 30 min. Synergy HT BioTek® USA micro-plate reader was used to determine the diminution in absorbance at 517 nm. Standard antioxidant was ascorbic acid (0.1 mM). Seventy per cent alcohol was taken as negative control. Triplicate method was used for carrying out this experiment. The value of IC₅₀ was calculated by Ez-fit-5 Perrella Scientific Inc., Amherst, USA software. Reduction in absorbance indicated greater radical scavenging activity which was determined by the following formula.

$$\% \text{ Inhibition of free radicals} = 100 - \left[\frac{\text{Absorbance of test solution}}{\text{Absorbance of control}} \right] \times 100$$

Where

Absorbance of control = Total radical activity with solvent.

Absorbance of test = Activity in presence of test compound.

Antibacterial activity

Ten homoeopathic mother tinctures were evaluated for their antibacterial activity through broth micro-dilution method.

Method for inoculum preparation

For the preparation of bacterial inoculum, few colonies of each bacterium were taken from 24-h-old cultures and shifted into nutrient broth. Then, solution was set for the concentration of 1×10^8 CFU/mL. At this concentration, turbidity of the solution was nearly equivalent to 0.5 McFarland standard. Bacterial inoculums were stored at 4°C.^[4]

Method for McFarland standard preparation

For preparation of 0.5 McFarland standard, 0.5 ml of 1.175% w/v barium chloride was added to 85 mL of 1% sulphuric acid (H_2SO_4) and mixed them thoroughly. After mixing, 1% H_2SO_4 was further added to make volume of 100 mL. Prepared solutions were checked for its optical density at 540 nm range which gives absorbance ranging from 0.12 to 0.19.

Broth micro-dilution method

The assay of antibacterial activity was described by Andrews.^[14] In this method, the antibacterial activity was performed in sterile 96-well micro-plates. Total mixture volume in each well was 150 μ L. It contained 75 μ L of extract solution (5 mg/mL) and 75 μ L of bacterial inoculum. Absorbance was checked at 540 nm using an ELISA micro-plate reader and it was taken as pre-read. After-read was taken at 540 nm after plates were incubated for 16–24 h at 37°C. The difference between pre-read and after-read was taken as an index of bacterial growth. All readings were taken in triplicate. Ciprofloxacin was taken as positive control (2 mg/mL) and distilled water was taken as negative control. Percentage inhibition was measured by following formula.

Inhibition (%) = O.D of sample/O.D of control \times 100

Statistical analysis

The results were analysed by SPSS (IBM Statistical Package of the Social Sciences version 20.0) software. One-way analysis of variance (ANOVA) for repeated measures followed by least significant difference *post hoc* test was applied for checking statistical significance of results. Significance level was set at $P \leq 0.05$.

RESULTS AND DISCUSSION

In the current study, ten homoeopathic mother tinctures were investigated for their antibacterial and antioxidant potential. Antibacterial activity was checked against two Gram-positive bacteria (S.A and B.S) and three Gram-negative bacteria (S.T, E.C and P.A). These bacterial strains are the commonly infection-causing bacteria in humans as B.S causes allergic reactions, food poisoning and eye infections.^[15] S.A is responsible for various diseases including skin (boils, itch), soft tissue, bone, joint, food poisoning, cardiovascular, respiratory and wound infections. S.T is responsible for typhoid fever. P.A can cause infections such as urinary tract infections, pneumonia, ear and eye infections and traumatic wound infections. E.C is an opportunistic organism causing pneumonia and sepsis in immunocompromised host and meningitis.^[16]

Flavonoids and phenolic compounds present in tinctures and extracts possess strong antioxidant potential.^[2] Several homoeopathic mother tinctures investigated in this study contain these active constituents.

Table 1 describes antibacterial activity of different mother tinctures against five bacterial strains while Figure 1 describes

antioxidant potential of homoeopathic mother tinctures. In the current study, homoeopathic mother tincture *Thuja occidentalis* showed percentage inhibition of 62.62 ± 1.33 , 62.75 ± 1.15 , 43.88 ± 1.15 , 14.09 ± 0.44 and 37.25 ± 0.49 against S.T, E.C, B.S, S.A and P.A, respectively. In a previous study, *Thuja occidentalis* homoeopathic mother tincture was evaluated for its antibacterial potential against S.A and P.A. Disk diffusion assay showed 20 mm zone of inhibition against S.A while 24 mm zone of inhibition against P.A.^[4] The results of the study were comparable to the current study in which mother tincture of *Thuja occidentalis* showed sufficient inhibition against all the tested strains. Hence, antibacterial activity of mother tincture of *Thuja occidentalis* is verified by broth micro-dilution assay that estimates the quantitative inhibition of bacteria. In the current study, homoeopathic mother tincture of *Thuja occidentalis* showed percentage inhibition of 82.34 ± 2.08 against DPPH at highest concentration tested (10 μ L). In a previous study, extracts from cones of *Thuja occidentalis* were tested for their antioxidant potential using DPPH-free radical scavenging assay. This study expressed significant antioxidant results of tested extracts.^[17]

Homoeopathic mother tincture *Pulsatilla* showed that the percentage inhibition against S.T, E.C, B.S, S.A and P.A was 80.64 ± 0.89 , 12.99 ± 2.85 , 79.28 ± 0.59 , 58.49 ± 2.66 , 82.28 ± 2.96 , respectively. *Pulsatilla* showed good percentage inhibition against S.T and P.A and showed moderate-to-medium activity against B.S. *Pulsatilla* showed poor activity against E.C. *Pulsatilla* contains flavonoids, tannins, carbohydrates, glucoside pulsatoside, triterpene saponins and steroids.^[18,19] Flavonoids and triterpenoids have marked antimicrobial activity.^[20] Antibacterial activity of *Pulsatilla nigricans* may be due to the presence of flavonoids and triterpenoids. Moreover, a previous study showed that protoanemonin from *Pulsatilla nigricans* is the main constituent responsible for its antibacterial activity.^[21] *Pulsatilla nigricans* showed the highest inhibition of DPPH (85%) among other tested plant mother tinctures. It contains high content of flavonoids^[18,19] that might be responsible for its antioxidant activity.

Homoeopathic mother tincture *Matricaria chamomilla* showed the percentage inhibition against S.T, E.C, B.S, S.A and P.A 85.46 ± 2.24 , 76.91 ± 3.40 , 77.80 ± 1.60 , 74.58 ± 0.04 and 79.18 ± 2.27 , respectively. *Chamomilla* showed the highest percentage inhibition against S.T. *Chamomilla* showed medium percentage inhibition against E.C, B.S, S.A and P.A. Homoeopathic mother tincture *Chamomilla* showed 71.17 \pm 2.80% inhibition of DPPH. In a previous study, *Matricaria chamomilla* essential oil showed decreased oxidation rate of soybean oil under accelerated conditions at 60°C.^[22]

Homoeopathic mother tincture *Hamamelis* showed that the percentage inhibition against S.T, E.C, B.S, S.A, *Pseudomonas* is 80.64 ± 0.89 , 12.99 ± 2.85 , 79.28 ± 0.59 , 58.49 ± 2.66 and 82.28 ± 2.96 , respectively. *Hamamelis* mother tincture showed excellent antibacterial activity against S.T, B.S and P.A and moderate-to-medium activity against S.A. *Hamamelis* showed medium antioxidant activity which is 68.10 ± 3.66 .

Table 1: Antibacterial activity of mother tinctures

Tested sample	Percentage inhibition (mean±SEM)*				
	<i>Salmonella typhi</i>	<i>Escherichia coli</i>	<i>Staphylococcus aureus</i>	<i>Bacillus subtilis</i>	<i>Pseudomonas aeruginosa</i>
<i>Calendula officinalis</i>	89.23±0.22 ^a	85.29±0.51 ^a	80.79±1.69 ^a	75.33±1.34 ^b	71.73±2.49 ^b
<i>Beta vulgaris</i>	60.75±2.14 ^c	87.83±0.12 ^a	71.14±0.09 ^b	69.69±2.04 ^c	64.69±0.09 ^c
<i>Allium sativum</i>	88.49±0.52 ^a	83.29±0.18 ^a	86.90±1.66 ^a	84.68±0.12 ^a	81.14±2.20 ^a
<i>Strychnos nux-vomica</i>	88.34±1.40 ^a	71.41±1.20 ^b	83.20±0.55 ^a	85.95±1.40 ^a	88.90±0.90 ^a
<i>Pulsatilla nigricans</i>	78.85±2.96 ^b	39.37±3.71 ^d	67.92±1.10 ^c	78.52±0.84 ^b	80.94±0.91 ^b
<i>Atropa belladonna</i>	85.99±0.22 ^a	74.21±2.56 ^b	69.03±1.55 ^c	81.02±0.38 ^b	81.49±2.25 ^a
<i>Hamamelis virginiana</i>	80.64±0.89 ^b	12.99±2.85 ^d	58.49±2.66 ^d	79.28±0.59 ^b	82.28±2.96 ^a
<i>Achillea millefolium</i>	29.03±2.84 ^d	59.50±0.88 ^c	68.03±1.86 ^c	65.73±0.08 ^c	74.85±1.24 ^b
<i>Matricaria chamomilla</i>	85.46±2.24 ^a	76.91±3.40 ^b	74.58±0.04 ^b	77.80±1.60 ^b	79.18±2.27 ^b
<i>Thuja occidentalis</i>	62.62±1.33 ^c	62.75±1.15 ^c	14.09±0.44 ^e	43.88±1.15 ^d	37.25±0.49 ^d
Ciprofloxacin (standard)	92.87±0.91 ^a	92.27±0.64 ^a	90.57±0.35 ^a	91.63±0.05 ^a	92.34±0.35 ^a

*Results were shown as mean±SEM (n=3). ^{a-d}Superscripts were different from each other in each specific column statistically. ANOVA was applied for checking statistical differences. P<0.05 was taken as significant. SEM: Standard deviation; ANOVA: Analysis of variance

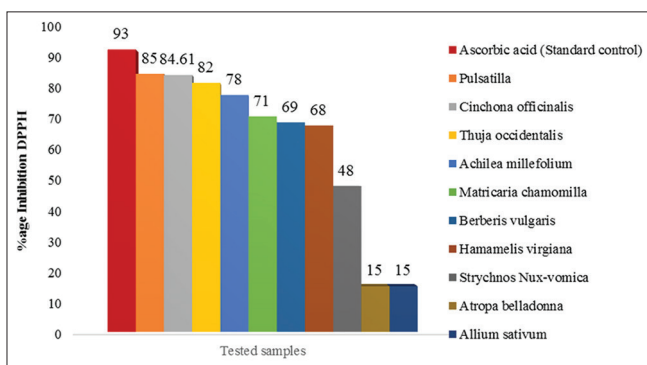


Figure 1: Antioxidant potential of various mother tinctures against 2,2-diphenyl 1-picryl hydrazyl-free radical in descending order

Polyphenolic flavonoids, anthocyanins, auxin and cytokinin are present in it^[23] that might be responsible for its antioxidant and antibacterial potential.

Homoeopathic mother tincture *Atropa belladonna* showed that the percentage inhibition against S.T, E.C, B.S, S.A, P.A is 85.99 ± 0.22, 74.21 ± 2.56, 81.02 ± 0.38, 69.03 ± 1.55, 81.49 ± 2.25, respectively. *Belladonna* has excellent percentage inhibition against S.T, E.C and P.A and moderate activity against E.C and S.A. In a previous study, *Atropa belladonna* was evaluated for the antibacterial activity against certain pathogenic bacteria, namely B.S and *Staphylococcus epidermidis* antibacterial activity. Both the extracts, i.e., ethanolic and methanolic extract, of the therapeutic plant *Atropa belladonna* has revealed antibacterial activity against the tested bacterial species.^[24] *Belladonna* has poor percentage inhibition of free radical which is 15.02 ± 3.24.

Homoeopathic mother tincture *Nux vomica* showed that the percentage inhibition against S.T, E.C, B.S, S.A and P.A is 88.34 ± 1.40, 71.41 ± 1.20, 85.95 ± 1.40, 83.20 ± 0.55 and 88.90 ± 0.90, respectively. *Nux vomica* has excellent percentage inhibition against S.T, B.S, S.A and P.A and moderate activity against E.C. In a previous study, the antibacterial activity of the *Strychnos nux-vomica* extract was performed by disc diffusion

method. The extract was tested against four pathogenic bacterial strains of Gram-negative and Gram-positive bacteria. Ethyl acetate extract of *Strychnos nux-vomica* showed a significant antimicrobial activity.^[25] *Nux vomica* Q has poor antioxidant activity which is 47.64 ± 4.49. Strychnine, the major component in the alcoholic extract of the seeds of *Strychnos nux vomica*, has no pro-oxidant property.^[26]

Homoeopathic mother tincture *Allium sativum* showed percentage inhibition against S.T, E.C, B.S, S.A and *Pseudomonas* is 88.49 ± 0.52, 83.29 ± 0.18, 84.68 ± 0.12, 86.90 ± 1.66 and 81.14 ± 2.20, respectively. *Allium sativum* Q has excellent percentage inhibition against S.T, E.C, B.S, S.A and P.A. In a previous study, antibacterial activity of *Allium sativum* extract was apparent within 1 h of incubation and 93% killing of *Staphylococcus epidermidis* and S.T was achieved within 3 h of incubation.^[27,28] Radical scavenging and anti-oxidative effects of garlic powder have proved to be an effective antioxidant when tested against at hepatic micro some stressed by ascorbic acid/Fe²⁺. Allicin has a very good hydroxyl radical. However, *Allium sativum* has poor percentage inhibition of DPPH in current study, i.e., 14.61.

Homoeopathic mother tincture *Cinchona officinalis* showed that the percentage inhibition against S.T, E.C, B.S, S.A and P.A is 89.23 ± 0.22, 85.29 ± 0.51, 75.33 ± 1.34, 80.79 ± 1.69 and 71.73 ± 2.49, respectively. *Cinchona* has excellent percentage inhibition against S.T, E.C and S.A. Medium percentage inhibition was showed by B.S. In previous studies, *Cinchona* showed antibacterial activity against several bacteria. *Cinchona* is highly recommended for the formulation of cosmetic products to protect the skin and hair against harmful microorganisms. Due to the presence of caffeic acid, flavonoids and the extract itself, *Cinchona* is useful in treating skin affections.^[29] Homoeopathic mother tincture *Cinchona officinalis* has excellent percentage inhibition, which is 84.61 ± 3.98.

Homoeopathic mother tincture *Achillea millefolium* showed percentage inhibition against S.T, E.C, B.S, S.A and P.A is

29.03 ± 2.8, 59.50 ± 0.88, 65.73 ± 0.08, 68.03 ± 1.86 and 74.85 ± 1.24, respectively. *Millefolium Q* has moderate to medium percentage inhibition against E.C, B.S, S.A and P.A. In a previous study, *Achillea millefolium* was found to be mildly active against Gram-positive and Gram-negative bacteria.^[30] *Millefolium* mother tincture has good antioxidant activity which is 77.81 ± 3.98. Results are in line to previous studies that showed *Achillea millefolium* possess a significant free radical scavenging activity which is due to the presence of phenolic compounds. The extract of *Achillea millefolium* has been investigated scavenging effects against DPPH radical. The antioxidant and total phenolic constituent levels are also positively correlated.^[31]

Homoeopathic mother tincture *Berberis vulgaris* showed that the percentage inhibition against S.T, E.C, B.S, S.A and P.A was 60.75 ± 2.14, 87.83 ± 0.12, 69.69 ± 2.04, 71.14 ± 0.09 and 64.69 ± 0.09, respectively. *Berberis vulgaris* has excellent percentage inhibition against E.C and moderate-to-medium percentage inhibition against S.T, B.S, S.A and P.A. In a previous study, the ethanolic and aquatic extracts of *Berberis vulgaris*, at a concentration from 35 to 40 µg/mL, showed an antibacterial effect against both Gram-positive and Gram-negative bacteria. In particular, P.A and E.C were the most inhibited.^[32] *Berberis Q* has good antioxidant activity which is 98.43%. Immunomodulatory and antioxidant effects of *Berberis vulgaris* fruits have been reported previously.^[33]

Homoeopathic mother tinctures are available in market in ready for use form and this study provides their antioxidant and antibacterial potential. Hence, despite the reported antibacterial and antioxidant potential of some of these extracts, reporting antioxidant and antibacterial activities of mother tinctures is important and valuable.

CONCLUSION

This study reveals that the above-tested mother tinctures have antibacterial and antioxidant potential against the particular microorganism and DPPH, respectively.

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Conflicts of interest

There are no conflicts of interest.

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कुछ होम्योपैथिक मदर टिंचर्स की जीवाणुरोधी और एंटीऑक्सिडेंट क्षमताओं का मूल्यांकन

पृष्ठभूमि: चिकित्सा की होम्योपैथिक प्रणाली में, पूतिदूषित (सेप्टिक) स्थितियों जैसे कई रोगों के उपचार के लिए मदर टिंचर का उपयोग किया जाता है।

उद्देश्य: यह अध्ययन आमतौर पर इस्तेमाल की जाने वाली होम्योपैथिक मदर टिंचर की जीवाणुरोधी और एंटीऑक्सिडेंट क्षमता का मूल्यांकन करने के लिए किया गया।

सामग्री और विधि: दस तैयार किए गए मदर टिंचर को सकारात्मक नियंत्रण के रूप में सिप्रोफ्लोक्सासिन के साथ शोरबा माइक्रो कमजोर पड़ने की विधि के माध्यम से पांच नैदानिक रूप से महत्वपूर्ण मानव रोगजनक बैक्टीरिया (साल्मोनेला टाइफी, ई. कोलाई, बेसिलस सबटिलिस, स्टैफिलोकोकस ऑरियस और स्यूडोमोनोस एरुगिनोसा) के खिलाफ परीक्षण किया गया। एंटीऑक्सिडेंट गतिविधि का अनुमान डीपीपीएच (2,2-डीफनाईल-1-पिकरायल हाइड्रेजल) निषेध परख द्वारा किया गया था। एस्कॉर्बिक एसिड को एंटीऑक्सिडेंट गतिविधि में सकारात्मक मानक के रूप में लिया गया था।

परिणाम: सभी मदर टिंचर्स ने कम या ज्यादा जीवाणुरोधी गतिविधि दिखाई। सिनकोना ऑफिशिनैलिस में सॉलमोनेला टाइफी के खिलाफ सभी परीक्षण किए गए मदर टिंचर्स की तुलना में अधिकतम गतिविधि (89% निषेध) थी। पल्सेटिला निग्रिकन्स ने अन्य परीक्षण किए गए पौधे मदर टिंचर्स के बीच डीपीपीएच (85%) का उच्चतम निषेध दिखाया।

निष्कर्ष: इस अध्ययन से पता चलता है कि उपरोक्त परीक्षण किए गए मदर टिंचर में क्रमशः विशेष सूक्ष्म जीवों और डीपीएच के खिलाफ जीवाणुरोधी और एंटीऑक्सिडेंट क्षमता है।

Évaluation du potentiel antibactérien et antioxydant de certaines teintures mères de médicaments homéopathiques

Contexte: En homéopathie, les teintures mères sont prescrites pour le traitement de plusieurs maladies telles que les états septiques.

Objectifs: La présente étude a été effectuée pour évaluer le potentiel antibactérien et antioxydant de 10 teintures mères couramment utilisées.

Matériels et méthodes: Dix teintures mères préparées ont été testées pour leur efficacité contre cinq bactéries pathogènes cliniquement importantes (*Salmonella typhi*, *E. coli*, *Bacillus subtilis*, *Staphylococcus aureus* et *Pseudomonas aeruginosa*) par la méthode de micro dilution en bouillon de culture avec la ciprofloxacine comme témoin positif. L'activité antioxydante a été estimée au moyen du test d'inhibition (2,2-diphényl-1-picrylhydazyl) au DPPH. L'acide ascorbique a été pris comme critère positif pour l'activité antioxydante.

Résultats: Toutes les teintures mères ont montré une certaine activité antibactérienne. Le *Cinchona officinalis* a montré une activité antibactérienne maximale (89 % d'inhibition) contre la *Salmonella typhi* par rapport à toutes les teintures mères testées. La *Pulsatilla nigricans* présentait le taux d'inhibition le plus élevé du DPPH (85 %) parmi les autres teintures mères testées extraites de plantes.

Conclusion: Cette étude révèle que les teintures mères testées ci-dessus ont un potentiel antibactérien et antioxydant contre certains micro-organismes et le DPPH respectivement.

Evaluación del potencial antibacteriano y antioxidante de algunas tinturas madre

Fundamento: En el sistema de medicina homeopática, las tinturas madre se prescriben en el tratamiento de varias enfermedades como las patologías sépticas.

Objetivos: Este estudio se efectuó para evaluar el potencial antibacteriano y antioxidante de 10 tinturas madre homeopáticas menos habitualmente utilizadas.

Materiales y métodos: Se examinó el efecto de las tinturas madre preparadas frente a cinco bacterias patógenas humanas clínicamente importantes (*Salmonella typhi*, *E. coli*, *Bacillus subtilis*, *Staphylococcus aureus* y *Pseudomonas aeruginosa*). El examen se realizó mediante un método de microdilución en caldo y utilizando ciprofloxacino como control positivo. La actividad antioxidante se estimó con el ensayo de inhibición del DPPH (2,2-difenil-1-picrilhidazilo). Se utilizó ácido ascórbico como estándar positivo en la actividad antioxidante.

Resultados: Todas las tinturas madre mostraron en mayor o menor medida una actividad antibacteriana. *Cinchona officinalis* mostró una actividad máxima (89% de inhibición) frente a *Salmonella typhi* en comparación con todas las tinturas madre examinadas. *Pulsatilla nigricans* mostró la inhibición más alta del DPPH (85%) en comparación con otras tinturas madre vegetales examinadas.

Conclusión: Este estudio revela que las tinturas madre arriba examinadas poseen un potencial antibacteriano y antioxidante frente a los microorganismos particulares y el DPPH, respectivamente.

Bewertung des antibakteriellen und antioxidativen Potenzials einiger homöopathischer Urtinkturen

Hintergrund: In der Homöopathie werden Urtinkturen bei der Behandlung von verschiedenen Krankheiten, beispielsweise septische Zustände, verschrieben.

Ziele: Diese Studie wurde mit zehn häufig verwendeten homöopathischen Urtinkturen zur Bewertung des antibakteriellen und antioxidativen Potenzials durchgeführt.

Material und Methoden: Zehn Urtinkturen wurden mit Ciprofloxacin als Positivkontrolle gegen fünf klinisch wichtige humanpathogene Bakterien (*Salmonella typhi*, *E. coli*, *Bacillus subtilis*, *Staphylococcus aureus* und *Pseudomonas aeruginosa*) getestet. Die Antioxidationsaktivität wurde durch DPPH (2,2-Diphenyl-1-picrylhydrazyl) Inhibitions-Assay abgeschätzt. Ascorbinsäure wurde als positiver Standard für die antioxidative Aktivität herangezogen.

Ergebnisse: Alle Urtinkturen zeigten eine mehr oder weniger antibakterielle Wirkung. *Cinchona officinalis* zeigte eine maximale Aktivität (89% Hemmung) gegen *Salmonella typhi* im Vergleich zu den anderen getesteten Urtinkturen. *Pulsatilla nigricans* zeigte die höchste Hemmung von DPPH (85%).

Schlussfolgerung: Diese Studie zeigt, dass die oben getesteten Urtinkturen ein antibakterielles und antioxidatives Potenzial gegen die jeweiligen Mikroorganismen bzw. DPPH aufweisen.

Evaluation of Antibacterial and Antioxidant Potential of Some Homeopathic Mother Tinctures

對一些順勢療法母酊的抗菌和抗氧化能力的評價

背景: 在順勢療法醫學體系中，母酊可用來治療一些疾病，如敗血症。目的：該研究是評價10種常用順勢療法母酊的抗菌和抗氧化能力。

材料與方法: 採用液基微量稀釋法，並以環丙沙星為陽性對照，對10種製備的母酊進行了針對5種臨床上重要的人類致病菌（傷寒沙門氏菌、大腸桿菌、枯草芽孢桿菌、金黃色葡萄球菌和銅綠假單胞菌）的測試。通過DPPH（1,1-二苯基-2-三硝基苯肼）抑制法測定抗氧化活性。抗壞血酸被認為是抗氧化活性的陽性標準。

結果: 所有母酊都表現出或多或少的抗菌活性。金雞納樹皮的抗傷寒沙門氏菌活性（89%抑制）高於所有測試的母酊。在其他測試的植物母酊中，白頭翁對DPPH的抑制率最高（85%）。

結論: 本研究顯示，上述測試的母酊對特定微生物和DPPH分別具有抗菌和抗氧化作用。