

Formulation and evaluation of herbal handwash containing Quercus infectoria galls extract

Krishnamurthy A. Kamalapurkar, Akshada R. Shendge*

Master of Pharmacy, Department of Pharmaceutics, D. S. T. S. Mandal's College of Pharmacy, Solapur – 413004, Maharashtra, India.

Submitted: 26-05-2022

Revised: 03-06-2022

Accepted: 07-06-2022

ABSTRACT

As natural medicines are safer and have fewer side effects, they are seen to be more appropriate than synthetic treatments. Herbal products have become more important in medical and commercial sector across the world. While the use of herbal therapies has increased, concerns regarding their quality, safety, and efficacy have emerged in both developed and developing countries. The extract of Quercus infectoria galls shows antibacterial activity against most of the pathogens. The purpose of this study was to formulate and evaluate herbal handwash to check whether it possess antibacterial activity against Staphylococcus aureus. Formulated handwash was evaluated for pH, viscosity, homogeneity, stability, foam height, and foam retention. The zone of inhibition of the prepared handwash was 45 mm, which was significantly greater than the commercial formulations.

Key words: Quercus infectoria galls, handwash, Staphylococcus aureus, tannic acid.

I. INTRODUCTION

The majority of infections are caused by a lack of hygiene. Infections can be spread via hands. Infections caused by microbes have become a serious problem among children and workers. Our skin needs to be protected from skin pathogens because it is the most exposed part of our body. Infectious diseases have become a major factor in hospital care, resulting in extended stays and high mortality rates. The hands of health-care workers are the primary routes of transmission of multidrug-resistant pathogens and infection to patients. As a result, the importance of antimicrobial handwashing is emphasized. In marketed formulations, many synthetic chemicals such as alcohol, chlorhexidine, and benzalkonium chloride are present. However, prolonged use of this formulation causes itching and dryness dermatitis. Herbal formulations containing plant extract now-a-days are more preferred because of their effectiveness and less side effects.^[1,2,3]

Quercus infectoria Olivier (Fagaceae) is a shrub mainly found in Iran, Asia Minor, Syria and Greece and it is commonly known as Manjuphal in Marathi language. The tree capitulates galls that emerge on its shoots because of assault of gall wasp. The galls of Q. infectoria have an immense medicinal use and features pharmacologically been deciphered to be astringent, antibacterial, antifungal, anti-diabetic anti-inflammatory, antioxidant, local anesthetic, and antiparkinsonian. The components of galls incorporate a large quantity of tannic acid and gallic acid, ellagic acid and syringic acid, β -sitosterol, amentoflavone, hexamethyl ether, iso-cryptomerin, hexagalloyl glucose, etc.^[4,5]

The present work was to formulate and evaluate antibacterial herbal handwash by using extract of Quercus infectoria. The main constituent present in extract is tannic acid, gallic acid, ellagic acid. The extract of Quercus infectoria galls shows good antibacterial activity. The handwash gel contains Carbopol as gelling agent, Sodium lauryl sulphate as surface active agent, glycerin for providing humectant. The antibacterial activity of formulated handwash was evaluated against the Staphylococcus aureus bacteria. Zone of inhibition of formulated Handwash compared with marketed formulation.

II. MATERIALS AND METHODS

• Plant materials:

The galls of Quercus infectoria Olivier were obtained from local supplier of Solapur. Identification and authentication were done by Prof. Dr M. N. Jagtap and Dr Ranadive, PG Department of Botany and Research Centre, DBF Dayanand College of Arts and Science, Solapur.

❖ Preparation of extract:

The galls of Quercus infectoria Olivier were extracted using 70 % ethanol. The galls were washed, dried and powdered in mortar. 10 g powdered material was soaked in 50 ml of ethanol at the temperature of 65 °C for 10 min with continuous stirring for 8 hr. The extract was filtered, dried and stored in air-tight container.

❖ **Chemicals and reagents:**

Carbopol 940, Sodium lauryl sulphate, Glycerin, Propylene glycol, Triethanolamine, Methyl paraben, Rose oil, Distilled water were purchase from Vikas pharma and drug, Mumbai and Ozone International, Mumbai.

❖ **Phytochemical Screening test of extract:**

The extract of Quercus infectoria galls was taken and subjected to qualitative analysis and identify the plant constituted present in extract. the phytochemical analysis was done to determine carbohydrate, tannin, glycoside, flavonoid content.

❖ **Formulation of handwash**

Take a weight quantity of Quercus infectoria extract and dissolve it in enough distilled water with glycerin and sodium lauryl sulphate to make a 10ml formulation, stir it, then soak the carbopol in enough water for 12 hours and add it to the mixture of extract and other excipients, stir for 5 minutes, and store in an air tight container for further evaluation.

Table No. 1. Formulation Table of Handwash

Sr. No.	Ingredient	F1	F2	F3	F4
1.	Quercus infectoria extract	0.2gm	0.2gm	0.2gm	0.2gm
2.	Carbopol 940	0.1gm	0.15gm	0.2gm	0.25gm
3.	Sodium lauryl sulphate	0.2 gm	0.2gm	0.2 gm	0.2gm
4.	Glycerin	4ml	4ml	4ml	4ml
5.	Propylene glycol	0.01ml	0.01ml	0.01ml	0.01ml
6.	Triethanolamine	0.01ml	0.01ml	0.01ml	0.01ml
7.	Methyl paraben	0.0001gm	0.0001gm	0.0001 gm	0.0001 gm
7.	Rose oil	0.1ml	0.1ml	0.1ml	0.1ml
8.	Distilled water	10ml	10ml	10ml	10ml

❖ **Evaluation Tests:** [6,7,8,9]

1. Physical appearance:

Physical appearance of formulation checked by visual method.

- Colour - The colour was observed by visually against black background.
- Odour - The odour of was checked by dissolving some amount of handwash in water and smelling it.

2. Homogeneity:

The formulation was tested for Homogeneity by visually and by touch. For determination of homogeneity of Handwash, press the small amount of handwash in between thumb and index finger. Formulated handwash of all batches is homogeneous.

3. Viscosity:

The viscosity of the Handwash was determined by using Brookfield DV-E LViscometer with helipath stand was used for viscosity studies. The reading was taken by using type s64 spindle at 10 rpm at 37 °C. Three readings were taken and then average reading was recorded.

4. Spreadability test:

1 g of sample was applied between two glass slides applied some uniform weight. The diameter of circle after spreading of formulation

was measured and determine time required for spreadability and calculate the spreadability by following formula-

$$\text{Spreadability} = M \times L / t$$

where, M = weight tied to upper side

L = length moved on the glass slide

T = time taken

5. pH :

pH of formulation was observed by digital pH meter. About 1 g of the handwash was weighed and dissolved in 50 ml of distilled water and pH was measured.

6. Stability:

The handwash shall be stable, but not to be deteriorating and segregate during normal storage conditions and usage. Stability of handwash can be tested when it exposes to 40±2 °C for a period of 30 days. After storage, no phase separation was observed.

8. Foam Height

1 g of handwash was taken and dispersed in 50 ml of distilled water. A 500ml measuring cylinder was used to transfer the dispersion. Water was used to make the volume up to 100ml. It was given 25 strokes and set aside. The height of the foam above the aqueous volume was measured.

9. Foam Retention

A 100ml graduated cylinder was filled with 25ml of the 1% handwash. Hands were placed over the cylinder and it was shaken ten times. For 4 minutes, the volume of foam was measured at 1 minute intervals.

10. Antimicrobial test:

Antibacterial activity against *Staphylococcus aureus* bacteria by Well plate diffusion Method The inoculum of the microorganism was prepared from the bacterial cultures. 15 ml of nutrient agar (Hi media) medium was poured in clean sterilized Petri plates and allowed to cool and solidify. 100 µl of broth of bacterial strain was pipetted out and spread over the medium evenly with a spreading rod till it dried properly. Wells of 6 mm in diameter were bored using a sterile cork borer. 1 gm handwash was dissolved in DMSO. These solutions were added to the wells. The petri plates incubated at 37 ° C for 24 h. streptomycin 10µg was prepared as a positive

control and DMSO was taken as negative control. Antibacterial activity was evaluated by measuring the diameters of the zone of inhibitions (ZI).

III. RESULT AND DISCUSSION

The handwash containing extract of *Quercus infectoria* gall shows good antibacterial activity against *Staphylococcus aureus*. In phytochemical analysis of extract showed presence of carbohydrates and tannic acid. Formulated handwash is light brown in colour and translucent, free from gritty particle and homogenous. All batches of formulation are stable. F1 formulation shows good viscosity, Spredability, and having more foam height and Foam retention hence F1 batch should be consider as optimum batch. The observed zone of inhibition of F1 batch was found to be 45mm and for standard antibiotics show 19mm and marketed formulation shows 22mm.

Table No. 2. Results of evaluation test

Sr No	Test	F1	F2	F3	F4
1.	Colour	Light brown	Light brown	Light brown	Light brown
2.	Odour	Rose like	Rose like	Rose like	Rose like
3.	Homogeneity	Translucent and Homogeneous	Translucent and Homogeneous	Translucent and Homogeneous	Translucent and Homogeneous
4.	Viscosity(cP)	289	302	324	369
5.	Spredability (g.cm/s)	17	12	11.54	9
6.	pH	6.8	6.7	6.8	6.8
7.	Stability	Stable	Stable	Stable	stable
8.	Foam height (ml)	86	80	78.3	79.9
9.	Foam retention (ml)	24	22.5	21.8	20

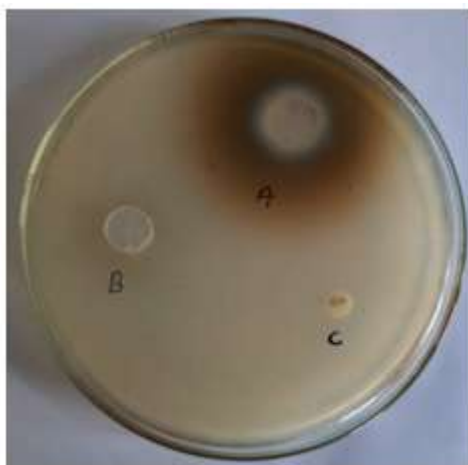


Figure No. 1: Zone of inhibition against *Staphylococcus aureus*. A – Hand wash(F1) containing extract of *Quercus infectoria* galls, B- Marked hand wash Formulation, C- zone for streptomycin antibiotic



Figure No. 2: Formulated handwash F1 batch

IV. CONCLUSION

The result suggest that the *Quercus infectoria* gall extract shows the antibacterial activity. The formulated herbal hand wash shows good antibacterial activity against *Staphylococcus aureus* and these activities are due to antibacterial constituent present in extract and formulated hand wash are alcohol free. Formulated gel is easily spreadable and pH of formulated hand wash is 6.8 which is nonirritant to skin. These herbal formulations are stable and effective against skin pathogen.

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