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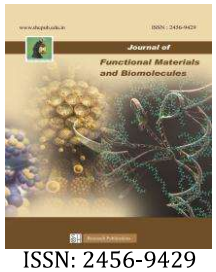

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In-vitro Preparation, Extraction and Antibacterial activity of Aloe vera extract

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Abstract

The medicinal plants represent an enormous reservoir of potential phytochemical compounds that could be useful as an alternative to allopathic drugs and are being used to develop Pharma drugs. *Aloe vera* has medicinal properties for the effective management of several aliments including Hepatitis. The present investigation was aimed to focus on the preparation of soap. And additionally antibacterial activity of Aloe vera in ethanolic and methanolic extracts. The main objective of the present work to establish the preparation of soap and *in vitro* antibacterial activity of methanol and ethanol extract of *Aloe vera.* Furthermore, the presence of these phytochemicals in *Aloe vera* can act as the therapeutic agents and they are responsible for antibacterial activity.

Keywords: Methanol, Aloe vera, DMSO and antibacterial agents.

1.Introduction

The current approach is moving more towards sustainable solutions, which can be observed in consumers' demand and acceptability for eco-friendly products. Local care of vein harvest sites and control of pain in patients undergoing surgery are the important duties of nurses as a member of the treatment team [1, 2]. Despite extensive improvements in wound dressings, care, and pharmacological and non-pharmacological agents controlling pain, more studies are still needed for pain control, accelerating surgical wound healing, and reducing complications. Added herbs to the dressings have led to the use of their antibacterial, anti-inflammatory, and antioxidant effects, which are helpful in wound contraction, angiogenesis, and epithelialization [3]. Aloe vera is one of these medicinal plants found in various countries, including Iran. Laboratory studies have shown that aloe vera has various effects, such as inhibiting thromboxane (a repair inhibitor), inhibiting histamine production (reducing itching and skin irritation), strengthening the immune system, and producing cytokines, increasing and changing collagen composition, improving wound healing, and decreasing local pain[4]. Plant-based sources such as edible coatings could be the best solution. Plant-based sources have been used as an extract or essential oil, requiring lengthy and costly downstream processing after getting the crude extract. Therefore, extensive research is going on to find excellent source material, that can be used alone or in combination with other edible coatings, and it emerged as an advantage for fresh produce industries as they have upraised the market value of their products by increasing their product validity. Since this approach protects fresh produce from external and internal injuries, provides safety, increases shelf life, and maintains quality, it is extensively utilized in food industries [5]. The term edible films and coatings are generally used interchangeably by many researchers.

However, there is a technical distinction between both terms. Edible coatings are hydrocolloids that can be applied to the product using different techniques such as dipping, brushing, and spraying, upon drying they form a film around the product, whereas edible films are first de-

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veloped into films using the liquid coating material and then adhere to the product surface [6]

The primary mechanism of action of edible films and coatings is to develop a thin layer or semi-permeable barrier around the product to minimize its contact with the external environment.

This will subsequently create a protective and modified atmosphere around the fresh produce, which can preserve its freshness for a long time [7].

If the film develops a very thick or extremely thin layer on a product surface, it may produce undesired results. An important criterion used to develop optimum coating and films considers several parameters such as economic reliability, mechanical properties, thermal stability, sensory properties, and barrier properties [8]. All these parameters are greatly influenced by the molecular weight and concentration of the material, the type of solvent used to prepare the coating, pH, temperature, and additives used. Therefore, this is challenging to formulate a coating or develop a film with the desired characteristics. Several materials have been characterized for their film-forming abilities, including lipids (waxes or oils), proteins (gelatin or whey protein), biopolymers (alginate or chitosan), and carbohydrates (starches or cellulose derivatives) [9]. Each material has a unique composition and function. Among these materials, Chitosan (β-(1–4)-2-acetamido-D glucose and β-(1–4)-2-amino-D-glucose units) is the most widely practiced biopolymer in films and coatings-making processes. Its inert and biodegradable nature and antimicrobial and antioxidant properties make it superior among other coating materials [10].

2.Experiment sections

2.1 Reagents and Chemicals

Ethanolic ethyl alcohol Drug resistant clinical strain of *Escherichia coli*, and *Staphylococcus aureus* were obtained from the Department of Biochemistry, Sacred Heart College (Autonomous), Tirupattur,Tamilnadu, India.

2.2 Study area

The study area was Thamalermutthur. Tirupattur district, tamilnadu, India Aloe barbadensis Miller has huge leavs that are 15-25 cm long and 10-14cm wide, with an avoid form with a high glossy texture having feather touch.

2.3 Collection and preparation of sample

Collection of Aloe barbadensis Miller preparation of extract the plant dry for the week. After a week the dried plants are ground into fine powder then stored in an airtight container. For preparing the ethanolic extract 10 grams of the powder of plant was mixed with 100 ml of Ethanolic in 1:10 ratio for 5 to 6 hours in soxhlet. After 6 hours the contents are filtered through whatman no, 1 filter paper. Then the filtrate was collected separately for futher activities [11].

2.4 Extraction of Aloe barbadensis Miller

From the dried area collection of Aloe barbadensis Miller were grinded by using a mortar and pestle, after the mashed soil, 10 grams of were dissolved by using 100ml of ethanol in the beaker in the presence of Soxhlet apparatus separately. From the obtained extracts of contents were filtered through the whatman no. 1 filter paper, filtrates were then concentrated in a rotary evaporator, which they are used for further studies [12].

2.5 Antibacterial activity

The Aloe Vera was evaluated for its antibacterial property against *Staphylococcus aureus*, and *Escherichia coli* by agar disk-diffusion method, Fresh culture (24 hrs) of these above-mentioned bacteria are prepared. Antibacterial activity was performed using the media Muller 10 Hinton Agar (MHA). MH agar was freshly prepared and sterilized in autoclave operated at 121°C or 15 lbs for 20 minutes. After sterilization, media was poured into sterile petriplates and allowed to solidify. 100 µL of freshly prepared strain was spread on the plate using L rod. Then a hole with a diameter of 6mm is punched aseptically with a sterile corn borer of a tip. Then three different volumes such as 50 µl, 100 µl and 150 µl (Concentration: 10mg/5ml DMSO) of Termite Mount Soil were poured into the well separately. DMSO (Dimethyl Sulfoxide) is used as negative control (NC) and commonly available antibiotic gentamycin, tetracycline and vancomysin is used as a positive con-

trol (PC) [13]. All the plates were incubated at 37 °C for 24 hrs and measure the zone formation around the well.

3.Results and Discussion

3.1 Preparation of soap

To prepare soap using the cold process, first, dissolve sodium hydroxide (lye) in distilled water and let it cool. Separately, melt oils or fats and allow them to reach around 40-50°C. Slowly mix the lye solution into the oils while stirring, then blend until the mixture reaches a thick, pudding-like consistency (trace). Add essential oils, colorants, or additives if desired, then pour the mixture into a mold [14]. Let it set for 24-48 hours before unmolding and cutting into bars. Finally, cure the soap for 4-6 weeks to harden and remove excess moisture (Figure 1).

S.no.	Organisms	NC DMSO	PC	Zone of Inhibition		
1	*Escherichia coli*	Nil	(Gen) 18 (mm)	19	18	17
2	*Staphylococcc us aureus*	Nil	(Gen) 18 (mm)	20	26	26

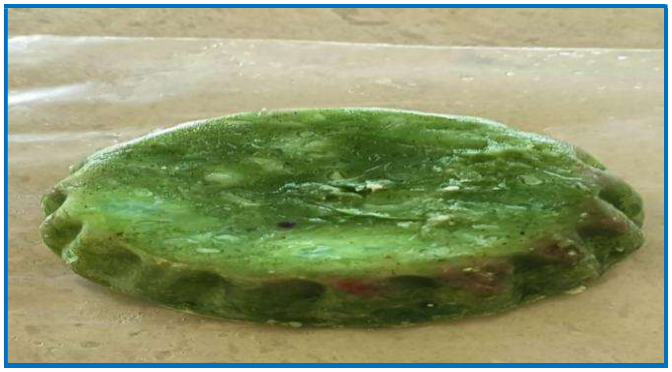

Figure 1: Preparation of Soap

3.2 Antibacterial activity

The antibacterial activity of the test compound was evaluated against *Escherichia coli* and *Staphylococcus aureus* at concentrations of 50 µg/ml, 100 µg/ml, and 150 µg/ml, using the agar well diffusion method. DMSO served as the negative control and exhibited no zone of inhibition, confirming its lack of antimicrobial effect [15]. Gentamicin (18 mm) was used as the positive control for comparison. Against *Escherichia coli*, the test compound exhibited moderate antibacterial activity, with zones of inhibition measuring 19 mm at 50 µg/ml, 18 mm at 100 µg/ml, and 17 mm at 150 µg/ml. interestingly, the zone size slightly decreased with increasing concentration, suggesting possible compound saturation or bacterial adaptation at higher concentrations [16-18]. In contrast, significant antibacterial activity was observed against *Staphylococcus aureus*, with zones of inhibition measuring 20 mm, 26 mm, and 26 mm at 50 µg/ml, 100 µg/ml, and 150 µg/ml, respectively (Table 1). The compound showed greater inhibition than the standard drug Gentamicin, particularly at higher concentrations, indicating a strong potential against Gram-positive bacteria [19-22].

Table 1: Antibacterial activity

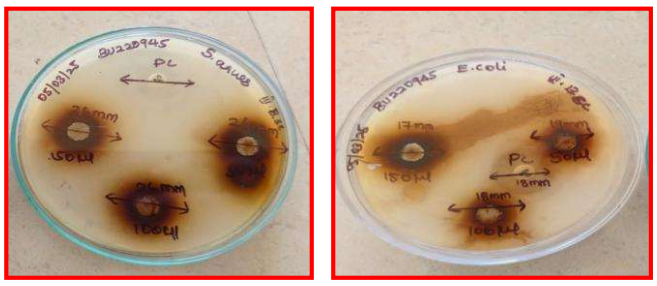

Figure 2: Antibacterial activity of Aloe vera

4. Conclusion

According to that present research work investigated for the investigation into the preparation of soap and antibacterial properties of Aloe barbadensis Miller (Aloe vera)

revealed promising results that support its medicinal potential. The antibacterial assessment demonstrated that Aloe vera extracts exhibited considerable inhibitory activity against both Gram-positive and Gram-negative bacterial strains. This suggests its potential for treating a wide range of bacterial infections. The effectiveness varied based on the type of extract (e.g., ethanol, methanol, or aqueous) and the bacterial strain tested, indicating that solvent selection plays a crucial role in enhancing bioactive compound extraction and additionally the preparation of soap were used to reduce the inflammation or against the pathogenic organisms.

However, further studies involving detailed mechanisms of action, toxicity assessments, and clinical trials are necessary to confirm its safety and efficacy for therapeutic use. Overall, Aloe barbadensis Miller holds significant potential as a natural, effective antibacterial agent with applications in pharmaceutical, cosmetic, and healthcare industries.

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Conflict of Interest: Nil

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