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‘’Formulate and Evaluate Antifungal Soap by Using Garlic Oil”

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ABSTRACT :-

An Antibacterial and antifungal soap was formulated using the different ingredients of soap base that have the chemical such as coconut oil, Sodium Lauryl Sulphate (SLS), and distilled water. The Antibacterial and antifungal soap is formulated by using the main ingredients such as the Garlic oil, Glycerine, Methyl Paraben, soft paraffin, Rose oil etc. garlic, one of the active principles of freshly crushed garlic homogenates, has a variety of antimicrobial activities.

Garlic in its pure form was found to exhibit

antibacterial activity against a wide range of Gram-negative and Gram- positive bacteria, including multidrug-resistant enterotoxigenic strains of Escherichia coli

antifungal activity, particularly against Candida albicans

antiparasitic activity, including some major human intestinal protozoan parasites such as Entamoeba histolytica and Giardia lamblia

antiviral activity. The main antimicrobial effect of garlic is due to its chemical reaction with thiol groups of various enzymes.

Keywords:- Alliinase, garlic, thiol enzymes, antibiotics, garlic, antimicrobials.

Introduction:-

Garlic oil is a strong-smelling oil made from garlic. It's usually pale yellow to orange-red and has the sharp, spicy smell typical of garlic. This oil contains natural compounds, mainly diallyl disulfide (DDS) and diallyl trisulfide (DTS), which give it its powerful effects.
People have used garlic in traditional medicine for a long time, and garlic oil is known to have many health benefits. It can kill bacteria, fungi, and viruses, and it also works as an antioxidant.
Because of these properties, garlic oil is useful not just for health but also in other areas. For example, it can be added to animal feed to prevent infections or used in farming as a natural pesticide to protect crops from pests and harmful fungi. Overall, garlic oil is a natural and effective antimicrobial agent with many possible uses.
Garlic oil can kill both harmful and harmless types of bacteria, including both gram-positive and gram-negative ones. Interestingly, fungi are even more sensitive to garlic oil than bacteria. While many studies have shown that garlic oil can fight microbes, we still don't fully understand how it works to kill them. This lack of knowledge makes it harder to use garlic oil more widely in medicine or agriculture.
To better understand how garlic oil works, scientists chose a common fungus called Penicillium funiculosum for their study. Most Penicillium fungi live on dead materials, but they can also spoil fruits, food, feed, and even industrial products.
This study will look at how well garlic oil can stop this fungus from growing. It will also explore what happens to the fungus over time after being treated with garlic oil—how its shape changes and what happens to the proteins in its cells. All of this will help researchers understand the way garlic oil works as an antifungal agent.
with the gas chromatography-mass spectrometry (GC/MS) analysis for the main constitutes of garlic oil, the antifungal effects and mechanism of garlic oil against P. funiculus will be elucidated.

Antibacterial activity of garlic

Crushed garlic has been known for a long time to kill many types of bacteria. Different garlic products can fight a wide range of bacteria, including both Gram-negative and Gram-positive types. These include harmful bacteria like Escherichia coli, Salmonella, Staphylococcus, Streptococcus, Klebsiella, Proteus, Bacillus, and Clostridium. Even tough bacteria like Mycobacterium tuberculosis (which causes tuberculosis) and Helicobacter pylori (which causes stomach ulcers) are affected by garlic.

Garlic extracts can also stop Staphylococcus bacteria from making harmful toxins (enterotoxins A, B, and C1), though they don't seem to stop toxin production from Clostridium botulinum. Early researchers Cavallito and Bailey found that the main power of garlic to kill bacteria comes from a compound in garlic itself.

Pure garlic extracts have shown strong effects even on bacteria that are resistant to antibiotics. This includes dangerous strains like methicillin-resistant Staphylococcus aureus (MRSA) and drug-resistant strains of E. coli, Shigella, Enterococcus, and others. Garlic even worked inside living organisms—for example, in a rabbit model infected with Shigella flexneri.

However, not all bacteria are affected by garlic. Some, like mucoid strains of Pseudomonas aeruginosa, Streptococcus haemolyticus, and Enterococcus faecium, are resistant. Scientists think this may be because these bacteria have sticky outer layers that stop the garlic from getting inside, but more research is needed to be sure.

Antifungal activity of garlic

Garlic extracts are also very effective against fungi. They can stop the growth of fungi and prevent them from making harmful toxins, like aflatoxin produced by Aspergillus parasiticus. The strong antifungal effect is believed to come mainly from garlic itself.

A special concentrated garlic extract—made up of 34% garlic, 44% thiosulfates, and 20% vinyl dithiins—was tested in lab conditions and showed strong power to stop or kill a fungus called Cryptococcus neoformans. This fungus can cause serious infections, especially in people with weak immune systems. The garlic extract was able to stop this fungus at very low doses—only 6 to 12 micrograms per milliliter.

Even better, when garlic extract was used together with a common antifungal drug called amphotericin B, their combined effect was even stronger.

Garlic also works well against Candida, the fungus that causes yeast infections. Just 7 micrograms per milliliter of pure garlic was enough to stop its growth. Studies showed that garlic could stop many types of fungi, including Candida, Cryptococcus, Trichophyton, Epidermophyton, and Microsporum, even at low doses (as little as 1.57 to 6.25 micrograms per milliliter).

Garlic blocks both the early stage of spore growth and later stages where the fungi grow thread-like structures (hyphae). Overall, garlic has strong antifungal power and could be very useful in treating fungal infections.

Antiparasitic properties of garlic

The ability of garlic to fight parasites has been known for a long time in many ancient cultures. For example, Albert Schweizer used crushed garlic to treat people with dysentery or intestinal worms, and in traditional Chinese medicine, garlic soaked in alcohol has been used to treat stomach diseases.

Scientists later confirmed that garlic is very effective against Entamoeba histolytica, a parasite that causes serious intestinal infections in humans. Just 30 micrograms per milliliter of garlic could completely stop the parasite from growing. Even at lower levels (5 micrograms per milliliter), garlic reduced the parasite's ability to damage human cells by 90%.

Garlic also worked well against other parasites like Giardia lamblia, Leishmania major, Leptomonas collosoma, and Crithidia fasciculata.

At very high doses, garlic can be slightly toxic to human cells in lab tests, but interestingly, when parasites were present, garlic didn't harm the human cells. This suggests garlic targets the parasites more strongly than it does human cells.

One reason garlic affects parasites and other microbes more than human cells is because microbes have very little or no glutathione. Glutathione helps protect cells by fixing enzymes that garlic can damage. Since microbes can't do this, garlic is more harmful to them than to human cells.

Antiviral activity of garlic

Garlic extracts, especially those with garlic as the main active part, have been shown to fight viruses both in lab tests (in vitro) and in living organisms (in vivo). Garlic can stop several viruses, including:

Human cytomegalovirus

Influenza B (flu virus)

Herpes simplex virus types 1 and 2 (which cause cold sores and genital herpes)

Parainfluenza virus type 3

Vaccinia virus (related to smallpox)

Vesicular stomatitis virus

Human rhinovirus type 2 (a cause of the common cold)

A special compound from garlic called ajoene has even stronger antiviral effects than garlic itself. In studies with HIV-infected cells, ajoene was able to block important processes the virus needs to spread.

However, not all viruses are affected by garlic. For example, the garlic plant virus X is resistant and doesn't respond to garlic extract. This shows that while garlic has strong antiviral powers, it doesn't work on every virus.

Aim: -

To formulate and evaluate Antifungal soap by using garlic oil.

Objectives: -

The ultimate aim of this study is to formulate and evaluate the Antibacterial, Antifungal, Antiparasitic, Antiviral soap using the garlic oil.

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Drug profile: -

1. Garlic oil: -

Fig.1 Garlic oil

Classification Kingdom: Ly
Son Island

Division: a species of bulbous flowering plant in the genus Allium

Class: hardneck and softneck

Subclass: Liliidae **Family:**
Alliaceae **Genus:** Genus Allium

Species: Allium sativum

Botanical name: Allium sativum

Biological source: - Garlic is the ripe bulb of Allium sativum Linn., belonging to family Liliaceae.

Geographical Sources: - central Asia, southern Europe, and United States. It is widely cultivated in India**.**

Parts used: - Bulb

Colour: - white

Description:- Garlic (Allium sativa) is a plant with long, flat grasslike leaves and a papery hood around the flowers. The plant is herbaceous, annual, and bulbous, and belongs to the family Amaryllidaceae. The greenish white or pink flowers are found grouped together at the end of a long stalk, which rises directly from the flower bulb. The bulb is the part of the plant used as food and medicine.

Chemical Constituents: -

Contains	**Percentage**
water	63%
Fructans (Carbohydrates)	28%
Organosulfur Compounds	2.3%
Alliinase (Protein)	2%
Arginine (Amino Acids)	1.2%
Fiber	1.5%

Uses

1. anticancer
2. antidiabetic
3. anti-inflammatory
4. antimicrobial
5. antioxidant
6. cardioprotective
7. immunomodulatory activities

Topical applications of Garlic Oil on Skin: -

1. May inhibit the growth of cancerous cells
2. Has been known for its antibacterial properties
3. inhibits and destroys bacteria, fungus, and parasites, as well as lowers blood pressure, cholesterol, and sugar levels, preventing blood clotting and protecting the liver
4. the strong anti-oxidants present in garlic help in reducing the free radical build up in the skin thus keeping it firm and youthful

Excipients

SODIUM HYDROXIDE:

- **IUPAC NAME:** Sodium hydroxide SYSTEMATIC
- **IUPAC NAME:** Sodium oxidanide
- CHEMICAL FORMULA: NaOH
- **MOLECULAR WEIGHT:** 39.997g/mol
- **APPEARANCE:** White, waxy, opaque crystals.
- **ODOR:** Odor less
- **MELTING POINT:** 318˚C
- **BOILING POINT:** 1,388˚C
- **SOLUBILITY:** Soluble in glycerol negligible in ammonia, Insoluble in ether slowly soluble in propylene glycol.

USES O

F SODIUM HYDROXIDE: Sodium hydroxide was historically used in the formulation of soaps, but is currently seen in a variety of formulas, including bath products, cleansing products, fragrances, foot powders, hair dyes and colors, makeup, nail products, personal cleanliness products, shampoos, shaving products, depilatories**COCONUT OIL:**

- BIOLOGICAL NAME: Cocos nucifera
- KINGDOM: Plantae
- ORDER: Arecales
- FAMILY: Arecaceae
- SPECIES: Nucifera

USES OF COCONUT OIL: Coconut oil is on a rise in popularity for treating skin conditions like eczema, psoriasis and other skin conditions

Materials and methods:

Formulation:

Sr No.	Ingredients	Quantity (%)	Uses
1	Coconut Oil	75gm	Moisturizing Agent / Antiaging Agent
2	Sodium Hydroxide (NaOH)	15gm	Lye (Used in making soap)
3	Distilled water	25ml	Aq. Vehicle
4	Sodium Chloride (NaCl)	3gm	Harden soap faster

Table No.2 Soap Base Formula

Formulation of Antifungal Soaps: -

Sr No.	Ingredients	Quantity (%)	Uses
1	Soap Base	75gm	Cleaning Agent
2	Garlic Oil	9ml	
3	Glycerine	3.5nl	Moisturising Cream
4	Soft Paraffin	2.50ml	Hardening Agent

5	Methyl Paraben	0.1mg	Preservatives
	Rose Oil	Q.s	Fragrance
6	Distilled Water	2.5ml	Vehicle

Table No.3 Formula of Antifungal soap

Herbal Ingredients: -

Herbal Plant	Scarce
Garlic	Ripe

Collection, identification and processing of plant: -

The separation and extraction method comprises the following steps:

peeling and crushing garlic into garlic puree, adding water for anxiolysis, then heating and preserving heat, further performing steam distillation, performing heat exchange and cooling with steam, and then condensing to get emulsion of the garlic oil.

Procedure of soap base formulation: -

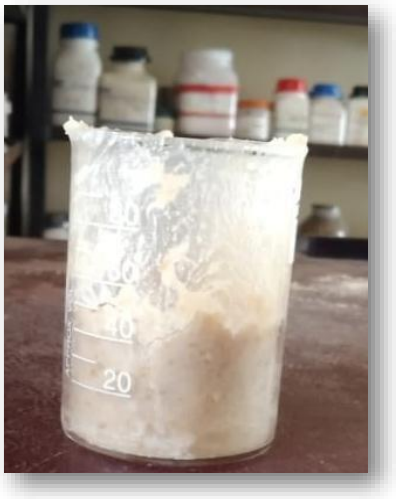

Fig.6 Soap Base

Soap Base Preparation method: -

1. For the preparing soap base, we take 75ml of coconut oil in a 500ml of beaker.
2. A. Put it on the water bath boil the liquid up to forming strong consistency under the temperature - C with stirring and note the temperature level by using thermometer.
3. Then we take NaOH or Lye was weighed into a clean beaker and add into the distilled water, again we maintain the temperature levels by using thermometer.
4. Add this solution to the coconut mixture, oil at - C up to formation of base consistency.
5. Then the mixture can be transfer into soap moulds and keep it the freezer up to 2-3 hours and then after 2-3 hours remove the soap containing moulds from the freezer then allow to 5 mints without disturbance then soap will be formed.

Procedure for the soap formulation: - Cold Process: -

1. When using thermometer in this experiment never use it to stir liquids. Instead, use a fire polished glass rod. To properly measure the temperature of a liquid, whole the thermometer so that its bulb is suspended in the centre of the liquid while reading the mercury level. If the

liquid is being heated on a hot plate, do not the thermometer bulb to rest on the bottom of the container, as it will then be over heated. Remove the thermometer from the container after each reading.

2. Weigh 150 ml beaker on the trip scale and add 15gm of NaOH pellets to it.
3. Handle NaOH with care as NaOH can burn the skin and is especially harmful to the eyes.
4. In the hood add 25ml of cold water to the beaker.
5. Stir the mixture of NaOH pellets and water, until a clear solution results.
6. Then place the beaker on the hot plate with low heat and with occasional stirring, melt the fat to melt completely.
7. Warm the melted fat to between 42-c˚.
8. Remove the fat from hot plate and add the Lye solution to the fat with stirring.
9. Stir the fat and NaOH mixture continuously and until an emulsion is formed.
10. Your mixture should look like a thick, light-yellow milk shake and should stay emulsified. If your emulsion separates, the fat is to hot and needs to cool.
11. Let the mixture cool on the bench top with occasional stirring until an emulsion, which does not separate, is formed.
12. You may want to add perfume or other additives at this point.
13. Pour the emulsion into a plastic cup and place in your drawer for the reaction to run.
14. Take the soap foam with you and let age for about 2weeks.
15. During this time a powdery layer of sodium carbonate will form on the surface, as residual NaOH reacts with Co2 in the air while the soap is drying.
16. This powdery layer should be sliced off and the soap is ready to be used.

Use of Soap: -

Garlic soap has antibiotic and antibacterial properties, is popular in treating fungus, difficult acne breakouts, and yeast infections. Great for all skin types.

Evaluation of Physicochemical Parameters of the Prepared Formulation: -

Various physicochemical parameters which are mentioned below were performed to establish quality of the prepared formulation while comparing to marketed soap formulation.

Physical parameters:

Clarity and colour were checked by naked eyes against white background, the Odor was smelled.

Organoleptic evaluation: -

1. Colour: - Yellow White
2. Odour: - Rose
3. Appearance: - Good

pH: -

The pH was determined by using pH paper. the pH was found to be basic in nature.

Fig. 8 pH

Microbial growth: -

Using agar plates the plates were placed in to the incubator and are incubator at 37C for 24 hours and compared with standard.

with Liquid Soap

without soap

Thermal stability: -

This soap is mainly stable at room temperature. Temperature increases it mainly unstable.

Foam Height:

0.5 grams of sample of soap was taken dispersed in 25 ml distilled water. then,
transferred it in to 100ml measuring cylinder; volume was made up to 50 ml with water. 25 strokes were given and stand till aqueous volume measured up to 50 ml and measured the foam height, above the aqueous volume.

Fig.9 Foam Height

RESULTS AND DISCUSSION:

Preparation and evaluation of physicochemical parameters: -

The physicochemical parameters of the prepared soap were determined. Parameters such as colour, odour, appearance, pH were tested. The formulations exhibited good as appearance characteristic as well as the pH was found to be in basic in nature. Other parameters such as Foam height, Foam retention, microbial growth, Temperature stability was determined; The results are tabulated**.**

Conclusion: -

The prepared formulation when tested for different test gave good results. It does not give any serious side effect to skin it was determined by using this soap.

An antibacterial soap has been produced successfully from Garlic oil and other ingredient in this study. The results from the physicochemical properties of the antibacterial soap of Garlic oil prepared was compared to standard soap.

The results imply that the soap produced is suitable for human skin. On the contrary, chemical soaps are full of damaging substances that can harm the skin as well as health. The multiple benefits of antibacterial soaps make them the right choice for better skin care, optimal health outcomes and used in bacterial infection. Moreover, it is a product innovation of an antibacterial medicated soap produced from Garlic oil, thus can be an affordable alternative therapy for consumers who have skin problems.

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