iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 13 **Issue:** V **Month of publication:** May 2025

DOI: https://doi.org/10.22214/ijraset.2025.71902

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue V May 2025- Available at www.ijraset.com

Preparation and Evaluation of Polyherbal Gel by Using Wheatgrass and Cucumber Extract

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Abstract: ***The increasing global interest in natural sources of bioactive compounds has significantly spurred research into the phytochemicalprofilesofvariousmedicinalplants.Topicalpreparations,designedforexternaluse,serveasaneffectivemeansfor both skinprotection and treatment, with diverse formulations such as creams, ointments, and gels available. This study aimed to prepare and evaluate a polyherbal topical gel utilizing ethanolic extracts of wheatgrass (Triticum aestivum) leaf and cucumber (Cucumissativus)fruit,bothrenownedfortheirnutritionalandtherapeuticpotential.Theplantmaterialswereauthenticated,and extract swereobtainedthrough acoldmacerationprocessusingethanol.AtopicalpolyherbalgelwasformulatedusingCarbopol- 940 asa gelling agent, incorporating the prepared extracts. The formulated gel underwentcomprehensive evaluationfor various physicochemicalparametersincludingappearance,pH,andspreadability.Furthermore,preliminaryphytochemicalscreeningwas conductedontheextractstoidentifykeybioactivecompounds.Theantibacterialactivityoftheformulatedgelwasassessed against Staphylococcus aureus using the agar diffusion method. The formulated polyherbal gel exhibited satisfactory physicochemical properties, including a desirable appearance, appropriate pH for topical application, and good spreadability. Phytochemical analysis confirmed the presence of various active constituents in both wheatgrass and cucumber extracts. Importantly, the gel demonstrated significant antibacterial activity against Staphylococcus aureus, indicatingits potential therapeutic efficacy. These findings suggest that the developed polyherbal topical gel offers a promising, safe, and natural alternative for dermatological applications, particularly in combating bacterial skin infections, while also providing soothing and moisturizing benefits.***

Keywords: Wheatgrass (Triticum aestivum), Cucumber fruit (Cucumis sativus L. Fruit), Phytochemicals, Topical Gel, Antibacterial activity.

I. INTRODUCTION

Medicinal plantshave been recognized globally as a potent source of active phytochemical compounds, offering therapeutic qualities widely utilized across various traditional and modern medical systems for the treatment and prevention of illnesses [1]. These plants contain arich arrayofsecondarymetabolitessuch asalkaloids, flavonoids,tannins,and essential oils, which contributeto their diverse pharmacological activities [2]. The growing interest in natural remedies has propelled extensive research into the potential of herbal extracts for developing safe and effective therapeutic agents. Topical preparations are designed for external application to the skin or mucousmembranes, providinglocalized effects for protection, treatment, or cosmeticbenefits[3].Among these, gelsarehighly favoureddue to their transparent to opaque semi-solid consistency, formed bya three-dimensional colloidalnetwork of a gelling agent within a liquid phase. This unique structure provides desirable rheological properties, including good spreadability, quick drying, and a non- greasy feel, which enhance patient compliance. Gels are particularly suitable for application on hairy areas and for delivering active ingredientsthatrequirelocal action [4].Wheatgrass(Triticum aestivum), theyoung grassof the common wheat plant,isrenowned for its exceptional nutritional and medicinal properties. It is a rich source of chlorophyll, vitamins (A, C, E, B-complex), minerals (iron, magnesium, zinc), amino acids, and enzymes [5, 6]. Research indicates that wheatgrass possesses significant antioxidant, anti- inflammatory, and immune-modulatory activities [7].

Furthermore, it has demonstrated promising antibacterial properties, making it a valuable candidate for topical formulations aimed at combating skin infections [8]. Cucumber (Cucumis sativus), a widely cultivated fruit, is recognized for its high-water content and beneficialphytochemicals,includingcucurbitacins,flavonoids,andphenolicacids[9].Traditionallyandcosmetically,cucumberisused for its soothing,hydrating, and cooling effects on the skin [10]. Itsanti-inflammatoryand antioxidant properties contribute to its skin-beneficialattributes,potentiallyaidingin skinrepairandprotection againstenvironmentaldamage[11].Somestudiesalsosuggestmild antimicrobial activity of cucumber extracts [12].

Thesynergisticeffectsofcombiningvariousplantextractsinapolyherbalformulationcan enhancetheirindividualtherapeuticbenefits andpotentiallyminimizeadverseeffects.

Given theestablishedpropertiesofwheatgrass(antibacterial,antioxidant,anti-inflammatory) and cucumber (hydrating, soothing, antioxidant, mild antibacterial), this studyaims to formulate and evaluatea polyherbal topical gel incorporating ethanolicextractsofwheatgrass leafandcucumber fruit.Thisresearch focuses on assessingthedermatological stability, physicochemical properties, and particularly the antibacterial activity of the developed gel against common skin pathogens like Staphylococcusaureus.Theoverarchingobjectiveistoexplorethefeasibilityofcreatingasafe,natural,andeffectivetopicalformulation for skin health and infection management.

A. Gels:

Gels are transparent to opaque semi-solid preparations, consisting of a liquid phase uniformly dispersed within a three-dimensional polymericmatrix formedbya gellingagent.Thisuniquestructureprovidesthegel with characteristicrheologicalproperties, makingit resistant to deformation and imparting desirable Visco-elastic properties [3]. Topical gels are highly favoured for dermatological applications due to several advantages: they are generally non-greasy, non-staining, and provide a pleasant cooling sensation upon application due to the evaporation of the solvent [4]. Their ease of spreadability and quick drying nature enhance patient compliance, makingthem suitable for application on various skintypes, includinghairyareas. Furthermore, gelscan facilitate controlledrelease of active ingredients and often exhibit good bio adhesive properties, ensuring prolonged contact with the skin surface [5].

However, topical gels also present certain limitations. Their ability to hydrate the skin can be limited if they evaporate too quickly without humectants, potentiallyleading to skin dryness [6]. The drug loading capacitymight be restricted depending on the solubility oftheactivepharmaceuticalingredient(API)intheaqueousorhydroalcoholicphase.Moreover,thestabilityofcertainactiveingredients can becompromised in an aqueousgel environment,andcompatibilityissuesmayarisebetween thegellingagentand other excipients or the active compounds [7].

B. Wheatgrass:

Wheatgrass(Triticumaestivum),theyoung grassofthecommon wheatplant,isrenowned for itsexceptionalnutritionalandmedicinal properties.Itisarich sourceofchlorophyll,essentialvitamins(A,C,E, B-complex),vitalminerals(iron,magnesium,zinc,selenium), aminoacids,andbeneficialenzymes[8,9].Researchindicatesthatwheatgrasspossessessignificantantioxidant,anti-inflammatory,and immune-modulatory activities, which are crucial for maintaining skin health and combating oxidative stress [10]. Furthermore, it has demonstratedpromisingantibacterialpropertiesagainstvariouspathogens,makingitavaluablecandidatefortopicalformulationsaimed at preventing and treating skin infections [11].

Wheatgrasstaxonomicalclassification[13,14,15]

Kingdom	Plantae
Division	Magnoliophyta
Class	Liliopsida
Order	Poales
Family	Poaceae
Subfamily	Pooideae
Tribe	Triticeae
Genus	Triticum
Species	T.aestivum

C. Cucumber:

Cucumber (Cucumis sativus), a widely cultivated fruit, isrecognized for its remarkably high-water content (approximately 95%) and beneficial phytochemicals, including cucurbitacins, flavonoids, and various phenolic acids [12]. Traditionally and cosmetically, cucumber is extensivelyused for its soothing,hydrating, andcooling effects on theskin, often employed toreduce puffiness and calm irritated skin [13].

Itsanti-inflammatoryandantioxidant propertiescontributetoitsskin-beneficial attributes, potentiallyaidingin skinrepair, promoting overall skin health, and protecting against environmental damage [14]. Some studies also suggest mild antimicrobial activity of cucumber extracts, which could complement the antibacterial action of other components in a polyherbal formulation [15].

Thesynergisticeffectsofcombiningvariousplantextractsinapolyherbalformulationcanenhancetheirindividualtherapeuticbenefits and potentially minimize adverse effects. Given the established properties of wheatgrass (notably antibacterial, antioxidant, and anti-inflammatory) and cucumber (hydrating, soothing, antioxidant, and mild antibacterial), this study aims to formulate and evaluate a polyherbal topical gel incorporating ethanolic extracts of wheatgrass leaf and cucumber fruit.

Thisresearchfocuseson assessingthedermatologicalstability,physicochemicalproperties,andparticularlytheantibacterialactivityof thedevelopedgelagainstcommon skin pathogenslikeStaphylococcusaureus.Theoverarchingobjectiveistoexplorethefeasibilityof creating a safe, natural, and effective topical formulation for skin health and infection management.

Cucumbertaxonomicalclassification[8,9]:

Kingdom	Plantae
Division	Tracheophyta
Class	Magnoliopsida
Order	Cucurbitales
Family	Cucurbitaceae
Subfamily	Cucurbitaceae
Tribe	Melothrieae
Genus	CucumisL.
Species	C.Sativus.L

Figno.1:wheatgrass

Figno.2: Cucumber

II. MATERIALS AND METHODS

Thissectiondetailstheplantmaterialcollection,extractionprocedures,andthemethodologyemployedfortheformulationand comprehensive evaluation of the polyherbal topical gel. Every chemical and reagent utilized was of analytical quality.

A. Collection&Authenticationofplants:

Thefreshplantmaterials,specificallywheatgrass(Triticumaestivum)andcucumber (Cucumis sativus) fruit, were locally cultivated and procured from the region of Sankeshwar, Maharashtra, India. The authenticityoftheplantspecimenswasrigorouslyverified bycomparingtheirmorphologicalcharacteristicswith descriptions provided in standard botanical literature and pharmacognosy references [16]. Further identification and confirmation were performed bya certified botanist to ensure the qualityand reliabilityof the raw materials for the formulation process.

B. PreparationofPlantExtract(ColdMacerationMethod)

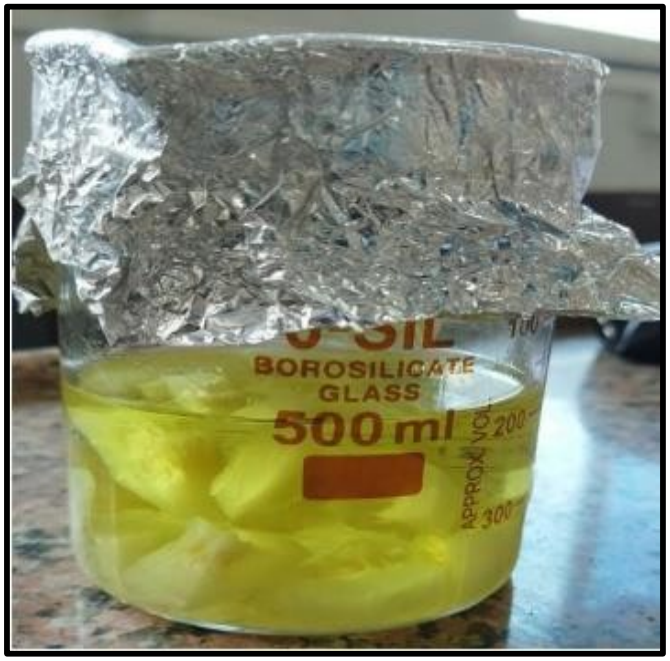
Thecollectedplantmaterialswerepreparedforextractionfollowing

- Wheatgrass: Freshwheatgrassbladeswereharvestedafter approximately8days ofgrowth,thoroughlywashedwithdistilled water, and then air-dried in a shaded, well-ventilated area for 4 days to prevent degradation of thermolabile constituents and reduce moisture content. The dried wheatgrass was then coarsely powdered using a mortar and pestle.

- Cucumber Fruit: Fresh cucumber fruits were washed, peeled, and sliced into small pieces to increase the surface area for efficient extraction.

The cold maceration method was employed for extracting bioactive compounds from both plant materials. For each plant material, 100 gramsof theprepared plantmaterial (dried powdered wheatgrassand sliced fresh cucumber) was transferred to separate clean, dry 500 ml beakers. Each beaker received 500 ml of 70% ethanol as the extraction solvent. This solvent was chosen for its effectiveness in extracting a broad range of polar and semi-polar phytochemicals. The beakers were tightly coveredwithaluminiumfoiltopreventsolventevaporationandcontamination,andthemixtureswereallowedtostandatroom temperature(20-25°C) for 48hours.Themixturesweresubjected tooccasional stirring tofacilitatethorough extraction ofthe active constituents. After the maceration period, the mixtures were initially filtered through a clean muslin cloth to remove coarseplantdebris,followedbyfinefiltrationusingWhatmanfilterpaper(No.1)toobtainclearethanolicextracts.Thefiltrates werethen subjected toevaporation usingarotaryevaporator (or ahotair oven ata controlled temperature) at 55°Ctoremove the ethanol solvent and obtain concentrated semi-solid extracts. The consistency was monitored until a viscous, semi-solid mass was achieved. The obtained extracts were stored in airtight containers in a cool, dark place until further use.

Figno.3:WheatgrassExtraction



figno.4:Cucumber Extraction

III. PHYTO CHEMICAL ANALYSIS

Thepreparedethanolicextractsofwheatgrassandcucumber fruitweresubjected toqualitativephytochemical screeningtoidentifythe presence of various bioactive compounds. This analysis was performed using standard protocols for the detection of alkaloids, carbohydrates, glycosides, saponins, proteins, tannins, steroids, and terpenoids. The specific tests performed were as follows**:**

A. CarbohydrateTest:

1) Molisch'sTest:

To2mLofextract, 2mLofMolisch'sreagentwas addedandshakenwell. Subsequently, 2mLofconcentrated sulfuricacidwas carefully addedalongthesideofthetesttube.Areddish-violetringatthejunctionbetweenthetwolayersindicatedthepresenceofcarbohydrates.

2) Fehling'sTest:

2ml of extracts was mixed with 1 ml of Fehling's solutionAand 1ml of Fehling's solution B. The formation of brick-red precipitate indicated the presence of reducing sugars.

3) TanninTest:

To 2 mL of extract, a few drops of 10% ferric chloride solution were added. The emergence of a green or blue have significant the existence of tannins.

4) FlavonoidTest:

Concentratedsulfuricacidwasappliedto2millilitresofextract.Ayellowish-orangecolour confirmedthepresenceofflavonoids.

B. AlkaloidTests:

1) Mayer'sTest:

Five to Six drops of Mayer's reagent were applied to two millilitres of extract together with 1% hydrochloric acid. Alkaloids were present because a creamy precipitate appeared.

2) Wagner'sTest:

To2mLofextract,afewdropsofWagner'sreagentwereadded.Alkaloidswerepresentbecauseareddish-brown precipitateformed.

C. Protein Tests:

1) BiuretTest:

1 mLof sodium hydroxide and 2 drops of copper sulphate solution were added to theextracts.Aviolet colour confirmed the presence of proteins.

2) XanthoproteinTest:

2 mL of extract was mixed with 1 mL of concentrated nitric acid. Upon heating, a yellow precipitate or solution was formed. After cooling, 1 mLof sodium hydroxide was added, and the formation of an orange colour confirmed the presence of proteins (specifically amino acids containing aromatic rings).

CardiacGlycosideTest(Keller-KilianiTest):

One millilitre of glacial acetic acid with two or three drops of ferric chloride solution was added to two millilitres of extract. One millilitre concentrated sulfuric acid solution was then carefully added [17, 18].

Figno.5:Phytochemicaltest

IV. FORMULATION OF POLYHERBAL GEL

The polyherbal topical gel was formulated by systematically combining the prepared plant extracts with a suitable gel base and other excipients. Three different batches (F1, F2, F3) were prepared with varying concentrations of extracts and excipients to optimize the formulation, as detailed in Table 1.

A. PreparationofGelBase

Thegelbasewas preparedbyaccuratelyweighingtherequired quantityofCarbopol-940, which served asthegellingagent. Carbopol- 940 was then slowly dispersed in a measured volume of distilled water (as per Table 1) under continuous stirring to ensure complete hydration and uniform dispersion. The mixture was allowed to stand for a sufficient period (e.g., 24 hours) to allow the Carbopol to swell completely and form a homogeneous dispersion.

B. PreparationofExtractMixture

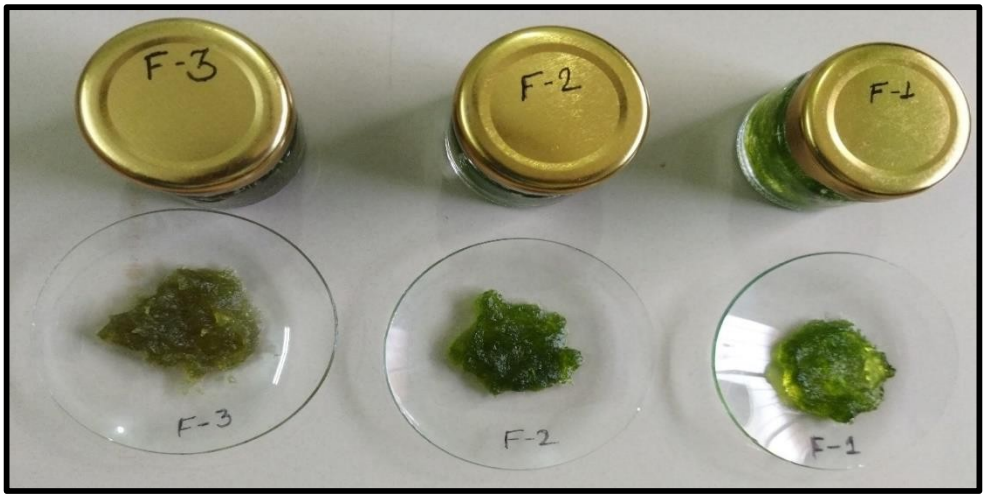
Theethanolicextractsofwheatgrassandcucumber fruit,obtainedasdescribedinSection 2.2,werepreciselymeasuredaccordingtothe specifiedquantitiesfor eachbatch(refertoTable1).Thesemeasuredextracts werethenthoroughlymixedtogetherinaseparatebeaker to ensure homogeneity before incorporation into the gel base.

C. IncorporationofExtractsintoGelBase

The prepared extract mixture was carefully incorporated into the hydrated Carbopol-940 dispersion. This was done slowly, under continuous and gentle stirring, to ensure uniform distribution of the plant extracts throughout the gel base, preventing any lump formation.

D. FinalAdditivesandpHAdjustment

After theuniform incorporation oftheextracts, other essential additives were introduced. Methyl Paraben wasaddedasa preservative topreventmicrobialcontaminationandensurethestabilityoftheformulationthroughoutitsshelflife(quantitiesasperTable1).Inorder toneutralizetheCarbopol-940,triethanolamine(TEA)wasfinallyaddedtothemixturedropwisewhilebeingcontinuouslystirred.This neutralization step is crucial as it causes the Carbopol polymer chains to uncoil and swell, leading to the spontaneous formation of a viscousgel.ThepHofthefinalgelformulationwasadjustedtoarangeof6.0-7.0(oryourspecifictargetpH,e.g.,7.0asinyour original document,butconsideringskincompatibility,arangelike5.5-6.5isoftenpreferredfortopicalproducts).Theadjustmentwasperformed until the desired consistency and pH were achieved.



Figno.6:Formulationofgel

TABLE1:FormulaforPreparationofPolyherbalgel[10]

Ingredients	Batch-1	Batch– 2	Batch– 3	Purpose
Carbopol-940	1	1.5	1	Gellingagent
WheatgrassExtract	2	3	4	Antibacterial
CucumberExtract	1.5	2	2.5	Hydration
Glycerine	1	1.5	1	Humectant
MethylParaben	1	1.5	1	Preservative
Triethanolamine	0.5	1	0.5	pHadjuster
RoseWater	1-2drops	1-2drops	1-2drops	Fragrance
Distilledwater	Upto 10	Upto 10	Upto 10	Vehicle

V. EVALUATION PARAMETERS

The formulated polyherbal topical gel batches (F1, F2, F3)were subjected to a series of comprehensive evaluation teststo assess their physical characteristics, stability, and suitability for topical application. The following parameters were evaluated:

A. Visual Appearance

The prepared gel formulationswere visuallyinspected for their physical attributes, including colour, clarity(transparency), homogeneity, and presence of anyaggregates or foreign particles. The observations were recorded to ensure uniformityacross all batches [10]

B. pHMeasurement

AcalibrateddigitalpHmeterwasusedtomeasurethepreparedgel'spH.Approximately0.5gofeachgelsamplewasaccuratelyweighed and dissolved in 50mLof distilled water.Thesolution wasallowed to equilibratefor two hoursbefore the pHreading was taken.The measurementwasperformedin triplicatefor each batch,andtheaveragepHvaluewasrecorded.Thisparameter iscrucialforensuring the gel's compatibility with the physiological pH of the skin. [10]

C. Spreadability

Spreadabilityisa criticalparameter fortopical preparations,indicatingtheeasewith whichthegelcan bespreadover the skin surface. It isdefined astheamount of time, under specific stress, it takes fortwo slides to separatefrom a gel layersandwiched between them. A faster separation time indicates better spreadability. The spreadability of the formulated gels was determined using the following formula [19]:

Where:

S=Spreadability(g.cm/sec)

M=Weighttiedtotheupperslide(g) L = Length of the glass slides (cm)

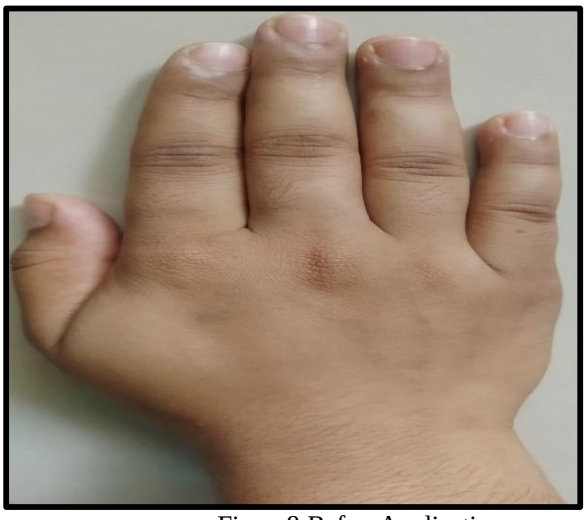
T=Timetakentoseparatetheslides(sec)

S=(M×L)/T

Figno.7:Spreadabilitytest

D. SkinIrritationTest(PatchTest)

Apreliminaryskin irritation test was conducted toassess thedermal compatibilityof the formulated polyherbal gel.Asmall quantity ofthegel (approximately0.5 g)wasappliedtoa1cm²areaon thedorsal sideofthelefthand ofa volunteer.Theapplication sitewas observed for anysigns of irritation, erythema (redness), itching, or swelling at regular intervals for up to 24 hours. Ethical considerations and informed consent were ensured prior to performing this test. [4]



Figno.8:BeforeApplication

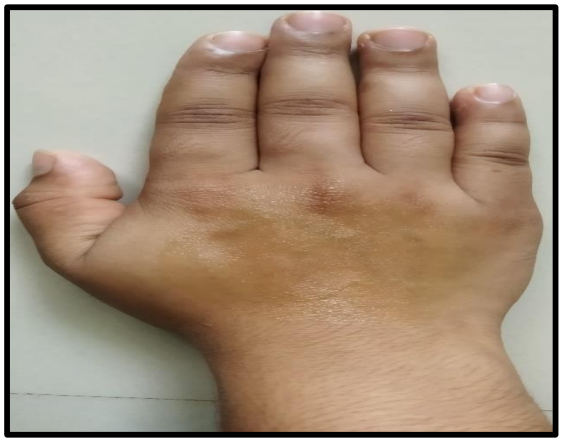


Fig.no.9: AfterApplication

VI. ANTIBACTERIAL ACTIVITY

Natural plant extractsantibacterial qualities are largelyresponsible for their medicinal value. Wheatgrass and cucumber are known to possess various phytochemicalsthat contribute tosuch activities. Specifically, the chlorophyll content in wheatgrass isrecognized for its diverse pharmacological benefits, including anti-aging, immune-modulatory, anti-carcinogenic, anti-inflammatory, and notable antibacterial properties [11, 12]. Similarly, cucumber plants contain compounds that exhibit antibacterial activity, meaning they can inhibitor control bacterial growth [9].Thisstudyaimedtoevaluatetheantibacterialefficacyoftheformulated polyherbal gelthatuses the agar well diffusion method to combat Staphylococcus aureus, a prevalent skin bacterium.

A. PreparationofMedia

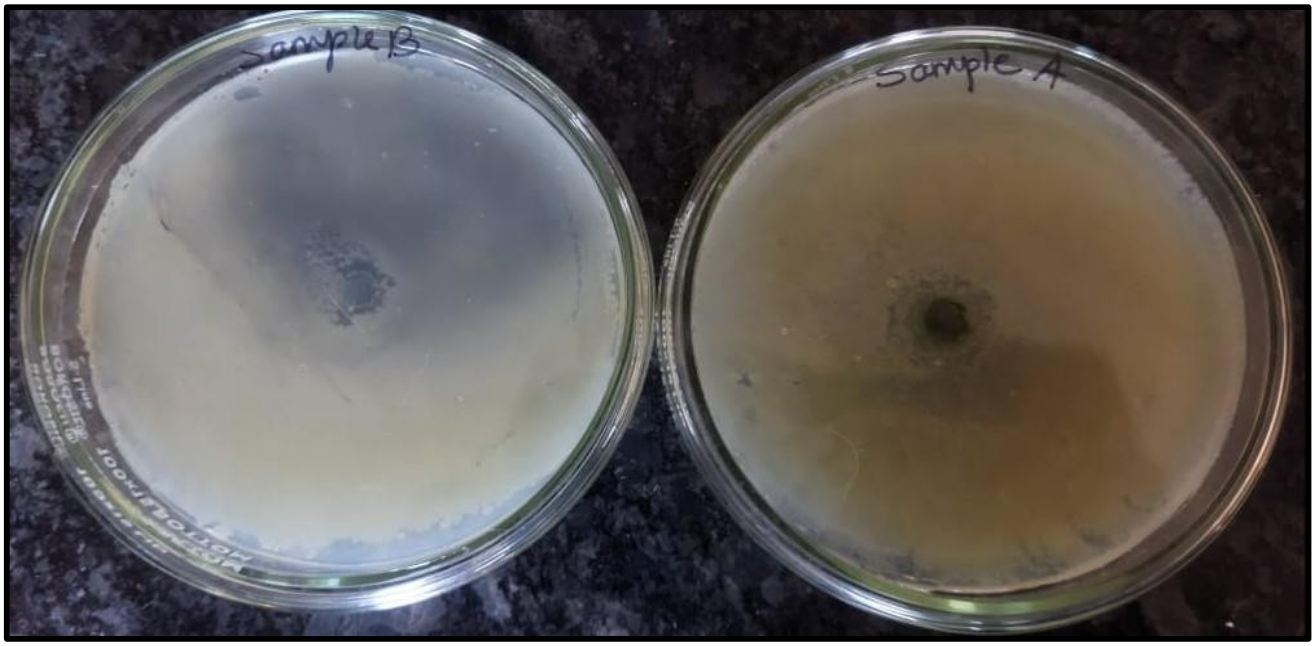
The preparation of Nutrient Agar (NA)medium followed the guidelines provided by the manufacturer. Aspecific amount of distilled water was used to dissolve agar powder.After adjusting the medium's pH to between 6.8 and 7.0, the solution was autoclave for 15 minutes at121^{0}Ctosterilizeit, thesterilemedium was allowed tocool toapproximately45-50°CbeforebeingpouredintosterilePetri dishes to solidify.

B. BacterialStrainandInoculumPreparation

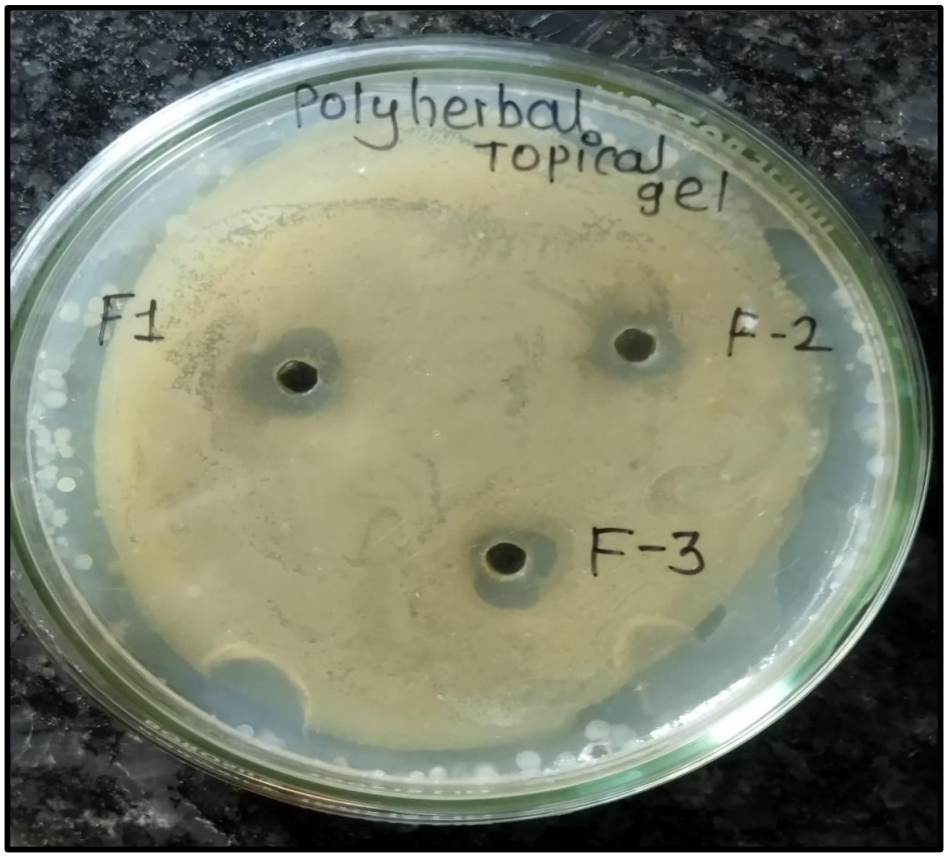
The bacterial strain used for theantibacterial activityassay was Staphylococcus aureus (obtained from a recognized microbial culture collection).Afresh bacterial inoculum was prepared bysuspending a fewcolonies from a pure cultureinto sterile physiological saline or nutrient broth. Theturbidity of the inoculum was adjusted to match 0.5 McFarland standard, equivalent to approximately1.5 × 10^8 CFU/mL, for consistent results [4].

C. AgarWellDiffusion Method

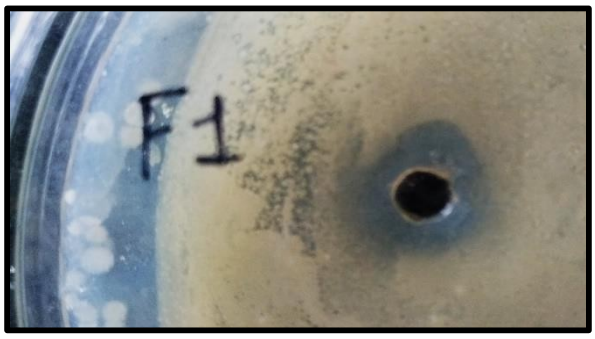
The antibacterial activity was assessed using the agar well diffusion method. Sterile cotton swabs were dipped into the prepared Staphylococcusaureusinoculumandevenlyspreadover thesolidified NutrientAgarplatestocreateaconfluentlawn ofbacteria.After the inoculum absorbed into the agar (approximately 10-15 minutes), wells were created in the agar using a sterile cork borer (6 mm diameter)Aprecise volume (e.g., 50 µL or 100 µL) of each polyherbal gel batch (F1, F2, F3) was carefully introduced into separate wellsusinga sterilemicropipette.Acontrol well containingplain gel base (without extracts)or apositive control (e.g., standardantibiotic solution)andanegativecontrol (e.g.,distilled water)werealsoincluded for comparison. Theplateswerethen incubatedaerobicallyat 37°C for 24 hours. Following incubation, the plates were observed for the presence of clear zones of inhibition around each well. The diameter of these zones(in mm) wasmeasured using aruler or a zonereader.Alarger zone of inhibition indicated higher antibacterial activity[4].



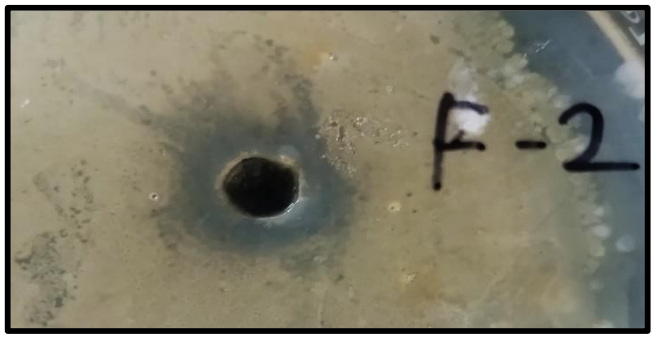
FigNo12:AntibacterialActivityofWheatgrassandCucumberExtract



Figno.13:Anti-BacterialActivityofGel



FigNo:Batch-1



FigNo:Batch-2

FigNo:Batch-3

VII.RESULT

Theformulatedpolyherbal topical gelbatches(F1,F2, F3)weresubjected toa seriesofcomprehensiveevaluation teststoassesstheir physical characteristics, stability, and suitability for topical application. The following parameters were evaluated:

A. ColourandAppearance

EvaluationoftheformulationforTopicalgelexaminingthecolourandappearancewereexaminedasphysicalcharacteristics.

Sr.No.	Batch	Colour	Appearance
1	F1	Green	Gel
2	F2	Green	Gel
3	F3	Green	Gel

Table2:ColourandAppearance

B. PhytochemicalAnalysis:

Chemicaltest	WheatgrassExtract	CucumberExtract
TestforCarbohydrate		
Molishtest	-	+
Fehlingtest	+	+
TestforTannin	-	-
TestforSteroids	+	-
TestforTerpenoids	+	-
Testforalkaloids	+	+
TestforFlavanoids	+	+
Testforprotein	-	+
TestforCardiacGlycosides	-	-

Table3:PhytochemicalAnalysis

- pH:ThepHofgel wasdetermined byusing Digital pHmeter 0.5g ofgel wasdissolved water andstored for twohours.The Measurement of pH was done in triplicate and average values are calculated:

Sr.No.	Batch	pH
1	F1	6
2	F2	6.6
3	F3	7

Table4:pHTesting

- Spredability:Thespreadabilitystudiesdemonstratedthatallformulatedgelspossessedgoodspreading properties, which is essential for uniform applicationon the skin. The results are summarized inTable

Sr.No.	Batch	Spredability (gm.cm/min)
1	F1	12.56
2	F2	15.89
3	F3	19.62

Table5:Spredability

Antibacterialactivity:

Sr.No	Batch	ZoneofInhibition
1	F1	10mm
2	F2	12mm
3	F3	14mm

Table6:Antibacterialactivity

VIII. DISCUSSION

Thissectioninterpretstheresultsfromphytochemicalanalysis,physicochemicalevaluation offormulatedpolyherbalgels(F1, F2, F3), and their antibacterialactivityagainst Staphylococcus aureus.These findingsarediscussed in comparison with existing literature. The phytochemical screening confirmed the presence of key secondary metabolites like (carbohydrates, tannins, flavonoids) in both wheatgrass and cucumber extracts (refer to Table 3). The presence of these active compounds in wheatgrass aligns with its known medicinal properties, including antioxidant and anti-inflammatory effects [11, 12]. Similarly, detected phytochemicals in cucumber support its traditional skin-beneficial and antimicrobial properties [9]. These findings validate the selection of both plants for this formulation.Thephysicochemicalevaluationconfirmedthegels'suitabilityfor topicaluse.Theirvisualappearance(transparent,green) indicated proper formulation. pH values (6.0-6.5) (refer to Table 4) were within the skin's physiological range, ensuring safety and compliance.Spreadabilitytestsshowedgoodspreadingproperties(F3showedhighestspreadability)(refertoTable5),essentialforeasy application. Crucially, the skin irritation test revealed no adverse reactions (refer to Section 5), confirmingthe gels' non-irritating and safe nature. Finally, theantibacterial activityassayagainst Staphylococcus aureus (refer toTable 6) showed promisingresults., "Batch F3 demonstrated thelargest zone of inhibition". This efficacyis likelydue to thesynergisticaction of bioactive compounds from both wheatgrassandcucumber extracts[9, 11,12]. Given Staphylococcusaureus'srolein skin infections,theobserved antibacterialactivity of the gel is significant, supporting its potential for skin health and infection management.

IX. CONCLUSION

Thepresentstudysuccessfullyformulatedandevaluatedpolyherbaltopicalgelsincorporatingethanolicextractsofwheatgrass(Triticum aestivum) and cucumber (Cucumis sativus). The phytochemical analysis confirmed the presence of various active constituents in the plant extracts, supporting their traditional uses and potential therapeutic applications. The formulated gel batches (F1, F2, F3) demonstrated satisfactory physicochemical properties, including, optimal pH within the skin's physiological range, and good spreadability, indicatingtheir suitabilityfor topical administration. Importantly, the preliminaryskin irritation test confirmed thenon-irritating and safe nature of the developed formulations. Furthermore, the gels exhibited promising antibacterial activity against Staphylococcus aureus, a common skin pathogen. (Specificallymention which batch showed the best activity, "Batch F3 showed the most significant zone of inhibition. This antibacterial efficacy can be attributed to the synergistic action of the bioactive compounds present in both wheatgrass and cucumber. In conclusion, the developed polyherbal topical gel offers a safe, effective, and natural alternative for potential use in managing skin health and preventing bacterial infections.

X. ACKNOWLEDGEMENT

I offer flower of gratitude to the almighty God, who has been the source of strength through my life. It is moment of gratification & prideto look back with sense of contentment atthelong-travelled path, to be abletorecapturesome fine moments, to be able to thank infinitenumber ofpeople, some whojoinedmeat some stage duringthe journey, whose kindness, love & blessingshas brought me to this day. I wish to thank each one of them. I wish to express thanks to Dr. Rahul Jadhav, Principle of Shivraj College of Pharmacy, Gadhinglaj for providing all facilities to carry out our research work. Dedicating above lines to my respective guide, Mrs. Supriya Panhale, Asst Professor, Shivraj College of Pharmacy, Gadhinglaj, Kolhapur for her much guidance and timely valuable suggestions which were very much helpful for me in completing and bringing out this research work. Her constant encouragement & onfalling support provided me the needed moral & confidence to carry out my work.I am expressing my since thanks to Teaching and Non-teachingstaffforttheirtime-to-timeco-operation.Oneofmostimportantpartofourlifeistheffriends.Wordsareinsufficienttoexpress my Gratitude towards my dear friends who stood up with me and help me always. Finally, yet importantly, I would like to pay high regards to my parents and relatives for their real love, trust, patience, tremendous support, blessing, encouragement, inspiration and moralsupportthroughoutmyresearchwork. Myeffortswouldnot havebornefruit withouttheirlovingsupport,hadworkandblessing.

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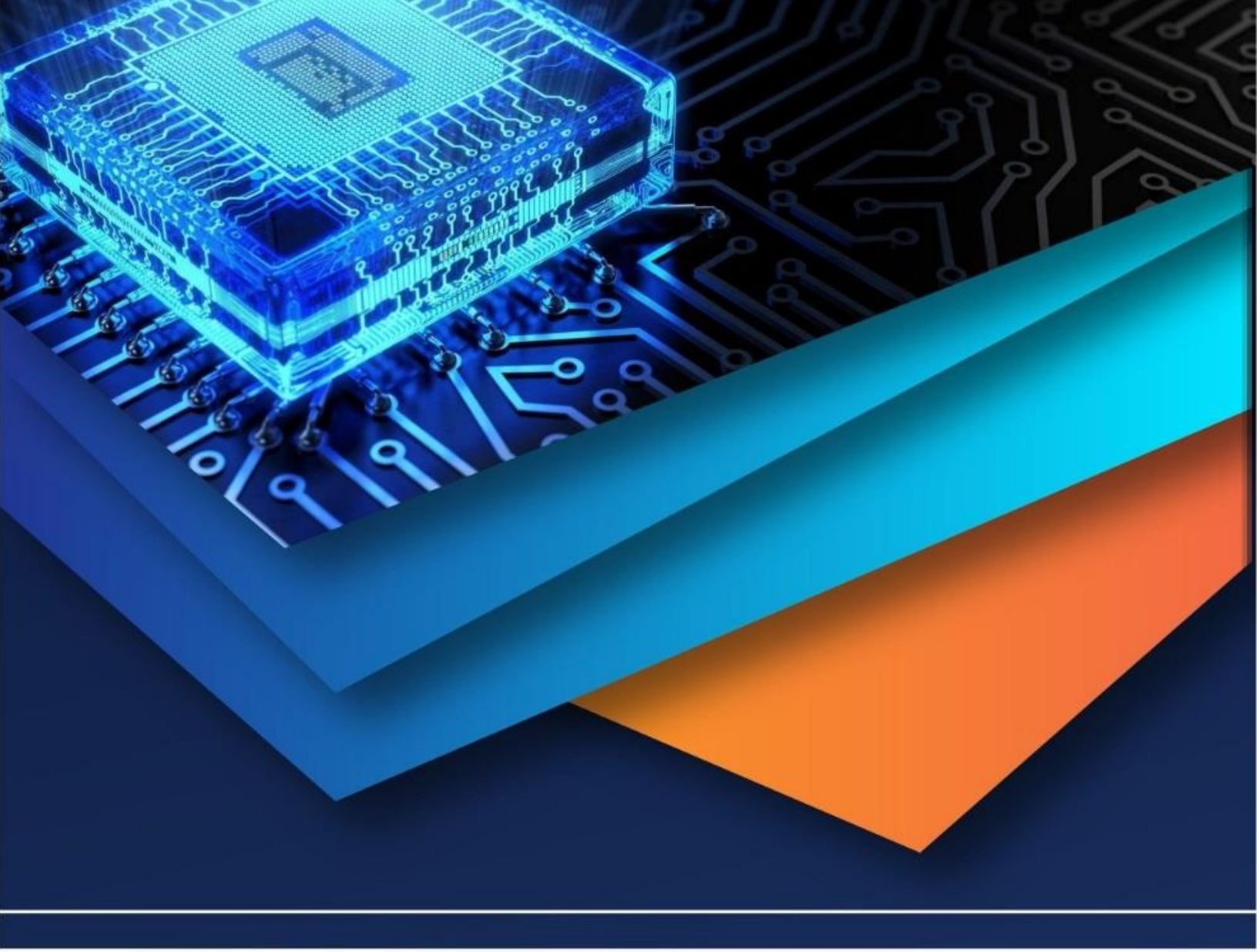

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