Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies ***NLM ID:*** *101716117*

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr Indian Citation Index (ICI) Index Copernicus value = 91.86

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

Formulation and evaluation of serum containingpolyherbal extracts of cinnamomum cassia & aloe vera for the treatment of wound infection

[1]Vipasha Rathi, [2]Ravinder Pal, [3]Karandeep Singh Sandhu

[1]Lecturer, Department of Microbiology, Sri Sukhmani Dental College and Hospital, Dera Bassi, Mohali, Punjab, India;
[2]Reader, Department of Biochemistry, Sri Sukhmani Dental College and Hospital, Dera Bassi, Mohali, Punjab, India;
[3]Reader, Department of Public Health Dentistry, Sri Sukhmani Dental College and Hospital, Dera Bassi, Mohali, Punjab, India

ABSTRACT:
Herbal formulations continuously have attracted substantial attention because of their good activity and relatively lesser or not as much of side effects with synthetic drugs. The herbal cosmetics manufactured and used usually for the daily purposes include herbal facewash, herbal hair gel, herbal soap, herbal shampoo, etc. the industry is now concentrating on the growing segment with a vast scope of various expansion in coming years. In the Indian system of medicines-Ayurveda *Aloevera*, *Cinnamommum cassia* has been mentioned as a remedy for treating wound injuries and infectious diseases. Wound occursdue to disruption of soft tissues that results from injury. Based on the folkloric use, the present study was designed to formulate and evaluate polyherbal gel containing extracts of *Aloevera* and *Cinnamommum cassia*..The Phtochemical (Secondary metabolites) screening of extracts are done which consists of alkaloid, Flavonoids, steroids or triterpenoids, phenols, carbohydrate and quantification of plants are done. Formulated gel were prepared which comprised of the methanolic extracts of *Aloevera* leaves and *Cinnmommum cassia* bark in concentration of 50% and 9% respectively in a base. It also consists of Sandalwood oil which is used for providing aroma to serum. The phytochemicals are majorly take part in wound healing. The prepared formulationswere evaluated for appearance and homogeneity, pH, aroma, spreadability, ash, stability. The formulation is also screened for their antimicrobial activity by disc plate method against *S.aureus*. The results of studies revealed that formulation under showed better zone ofinhibition as compared with the control. The formulated polyherbal gel were observed to possess antimicrobial action. The effective activity may be attributed to the synergistic action of the plants constituents present in the formulation. The formulated serum shows increased antimicrobial activity by 0.5%. An attempt was made to give an insight into the reported medicinal plants with wound healing mechanisms which could be beneficial in therapeutic practice and development of new wound healing serum for human use.
Keywords: Phytochemicals, Alkaloids, Flavonoids, triterpenoids, phenols, carbohydrate, Saponins, Cinnamomum cassia, Aloevera, Herbal Serum Formulation, AntimicrobialSusceptibility Testing.

Received: 23 June, 2022 Accepted: 28 July, 2022

Corresponding author: Ravinder Pal, Reader, Department of Biochemistry, Sri Sukhmani Dental College and Hospital, Dera Bassi, Mohali, Punjab, India

This article may be cited as: Rathi V, Pal R, Sandhu KS. Formulation and evaluation of serum containing polyherbal extracts of cinnamomum cassia & aloe vera for the treatment of wound infection. J Adv Med Dent Scie Res 2022;10(8):104-109.

INTRODUCTION

Herbal cosmetics are referred to as products formulated using various permissible cosmetic ingredients to form the base in which one or more herbal ingredients are used to provide defined cosmetic benefits (1). Serums, or concentrates, include about ten instances extra of biologically lively materials than creams, consequently faster and extra efficiently dealing with beauty problems. They may be used no matter age (2). Medicinal plants are a rich source of compounds that can be used to develop drug synthesis.(3). Plant- derived compounds can dramatically improve hard-to- treat illnesses, such as cancer. The toxicity and adverse effects of conventional and allopathic medicines have also been important factors in the sudden increase in population demands and increase in the number of herbal drug manufactures as well as a reduction in the use of

chemical drugs (4).

Herbal plants Cinnamomum cassia, belongs to the plant kingdom family of Laurels is used in various types of herbal medicine and nutrition and rich source of Iron, calcium and manganese, as well as dietary fiber (5). Different nutrients are present like Sodium, carbohydrates, sugar, fatty acids, amino acids and so on are included in cinnamon. In action, it is carminative, astringent, relaxing, antiseptic. This herb's essential oil serves as an effective antibacterial, anti-fungal and uterine stimulant (6,7).

Aloe-vera: loe-vera (Fam.-Liliaceae) is used in Ayurvedic, homoeopathic, and Ayurvedic herbs. Aloe vera is a plant similar to cactus, but it is synonymous with onions, garlic and asparagus (8). The leaves of the plant contain different vitamins, minerals, Amino acids, enzymes, natural sugars, and other bioactive compounds Anti-inflammatory, anticancer, antioxidant, emollient, purgative, antimicrobial, anti-inflammatory, aphrodisiac, anthelmintic, antifungal, antiseptic, and cosmetic values. Species of the Aloe plant Had extreme antimalarial activity (9, 10).

Staphylococcus aureus is a common cause of skin infections such as skin abscess, respiratory infections such as sinusitis and food poisoning (11). Herbal formulation means a dosage type consisting of one or more herbs or refined herbs in specific amounts to provide specific nutritional, cosmetic and/or other benefits for use in the diagnosis of human or animal diseases (12). Herbal products are of different types : solid products , liquid products, gaseous products, semi liquids. These products are useful in variousskin conditions like psoriasis, shingles and other associated with itching, in addition-cuts, abrasions and burns are said to be benefit from topically applying the leaf's gel to the affectedarea (13). With this view, aim was, To study antimicrobial activity of *Cinnamomum cassia* & *Aloevera,* isolate microorganisms present on wounded skin, study effects of formulated serum against isolated microorganisms.

MATERIAL AND METHODS

SAMPLE

The herbal plants were taken from market and *Cinnamonum cassia* bark were taken crushed using pistel motor and aloe-vera are cut using knife. *Aloevera* leaves were taken by removing gel. Leaves were dried in oven at temp of 105°C, in a test tube powder was took and methanol added and vortex it, leave it for whole night.

FOLLOWING QUALITATIVE PHYTOCHEMICALS ANALYSIS WERE DONE

Alkaloid's test, Flavonoids, Steroids and triterpenoids, Phenols, Glycoside, Carbohydrate, Phlobatannis, Saponins.

FOLLOWING QUANTITATIVE PHYTOCHEMICAL ANALYSIS WERE DONE

Alkaloid, carbohydrate, saponins, phenol, flavonoids, Tanins

PREPARATION OF MEDIA AND ISOLATION OF BACTERIA

Patient swab was collected from wounded elbow of patient admitted to Government Medical & Hospital sector-32, Chandigarh. Spreading was done on MSA media plate. MSA plate converted from red to yellow. It's the indication of *S. aureus* presence. Identification of Bacteria was done by Gram's staining.

FOLLOWINGS BIOCHEMICAL TEST WERE DONE

Coagulase tube, Catalase, Casein Hydrolysis, Citrate utilization, Urease, Methyl Red, V.P (Voges-Proskauer), Nitrate Reduction, Carbohydrate Utilization, Oxidase, Indol.

SERUM FORMULATION WAS DONE IN

Oil phase, Water phase, Serum Bead.

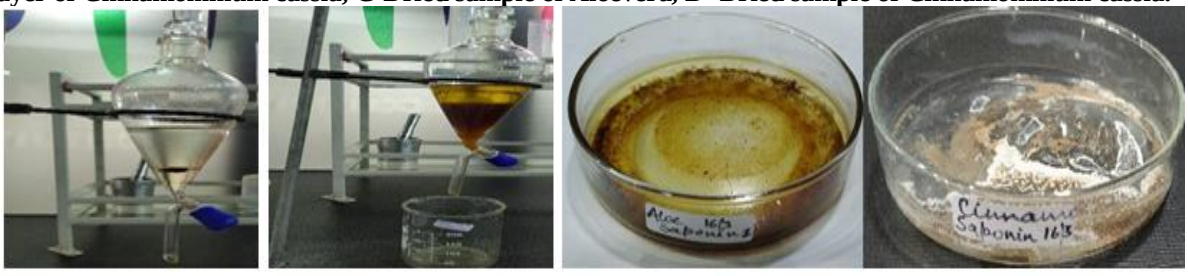
IN-VITRO EVALUATION OF FORMULATED SERUM SAMPLE WAS DONE WITH

Psychorheological Characteristics, pH Determination, homogeneity, Ash test, Spreadbility, Stability Study, Skin Irritation Test.

Anti-microbial test was performed in *Staphylococcus aureus with* Antimicrobial disks.

RESULT & DISCUSSION

Figure1: A-Separating funnel showing distinct layer in Aloevera, B-separting funnel showing distinct layer of Cinnamommum cassia, C-Dried sample of Aloevera, D- Dried sample of Cinnamommum cassia.



A B C D

QUALITATIVE PHYTOCHEMICAL ANALYSIS

Table1: Phytochemicals Tests of *Aloevera(1) and Cinnamommum cassia(2)*

Phtochemicals	Result (1)	Result (2)
Alkaloid	+ve	+++ve
Flavonoid	+++ve	-ve
Steroid/triterpenoids	++ve(Triterpenoids)	+ve(Triterpenoids)
Phenols	++ve	-ve
Glycoside	-ve	-ve
Carbohydrate	+++ve	+++ve
Phlobatannis	+ve	+++ve
Saponins	+ve	+ve

Figure 2: Qualitative Phytochemical tests for Aloevera A: Alkaloid, B-Flavonoids, C-Steroids/Triterpenoids, D-Phenols, E-Glycoside, F-Carbohydrate, G-Phlobatannis, H-Saponins.

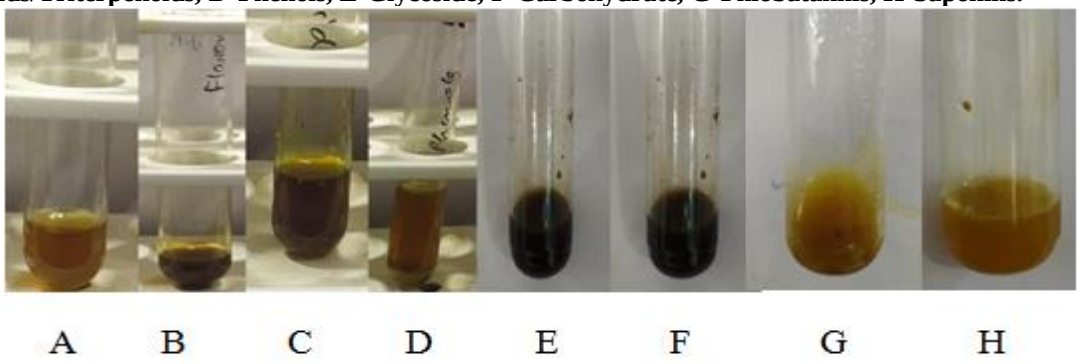


Figure 3: Qualitative Phytochemical tests for Cinnamommum cassia A: Alkaloid, B-Flavonoids, C-Steroids/Triterpenoids, D-Phenols, E-Glycoside, F-Carbohydrate, G-Phlobatannis, H-Saponins

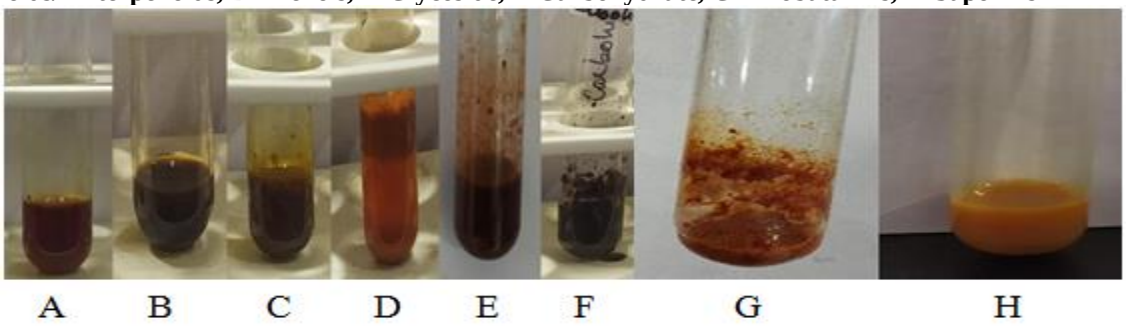


Table 2: Quantitative Phytochemicals of Alkaloids

Plant	Initial weight of petriplate	Final weight of petriplate	% of alkaloid Content
Aloevera	47g	48g	20%
Cinnamonum cassia	35g	36g	20%

Table 3: Quantitative Phytochemicals of Saponins

Plant	Initial weight of petriplate	Final weight of petriplate after dry	% of saponin content
Aloevera	39g	40g	20%
Cinnamonum cassia	32g	34g	40%

Table 4: Quantitative Phytochemicals of Flavonoids

Plants	Initial weight of petriplate	Final weight of petriplate	% of flavonoids Content
Aloevera	33g	34g	20%

Table 5: Quantitative Test for Carbohydrate,Phenol, Tannin

S. No	Quantitative Test	Sample	Total Content
1.	Carbohydrate	*Aloevera Cinnamomum cassia*	3.06g/ml6.1g/ml
2.	Phenol	*Aloevera*	1.97g/ml
3.	Tannin	*Aloevera*	3.55g/ml

Figure4: Before UV Absorbance of Phenol Blank and *Aloevera*

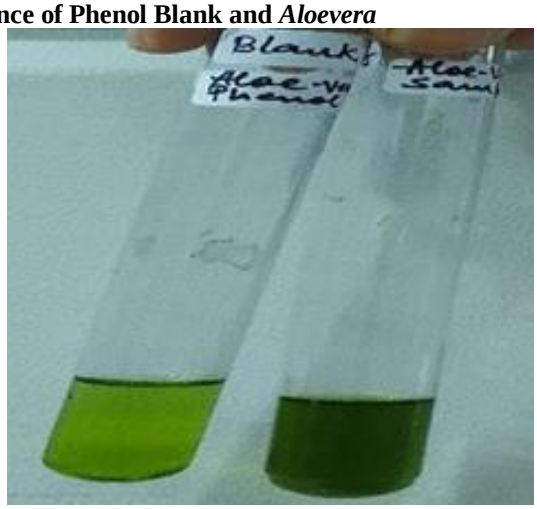


Figure5: UV Absorbance of Phenol

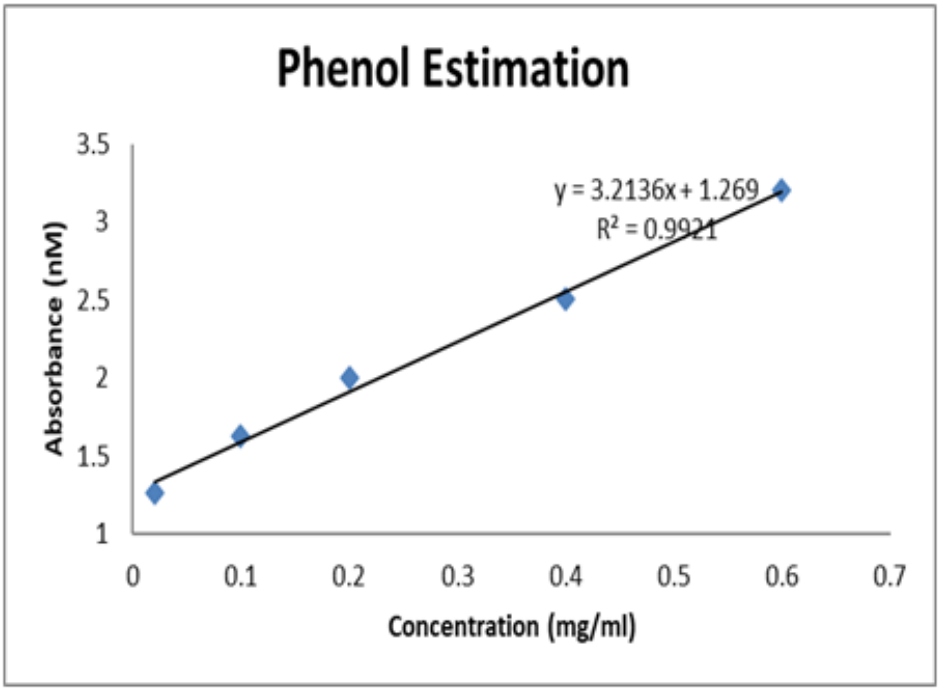


Figure 6: Before UV Absorbance of Tannin Blank and *Aloevera*

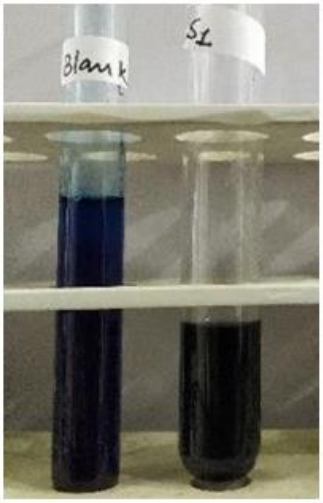
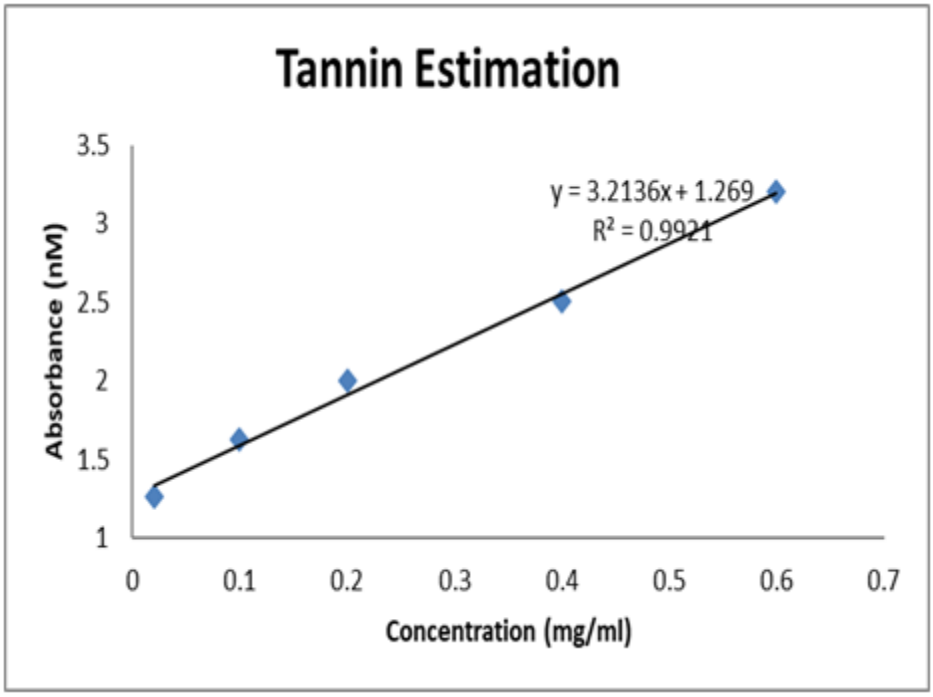


Figure 7: UV Absorbance of Tannin



BIOCHEMICAL TESTING OF ISOLATED BACTERIA

After the incubation of 24 hrs yellow colour colony is visible which is indication of *Staphylococcus aureus.* **Biochemical test for *Staphylococcus aureus:*** Gram Staining test: gram +ve, Gram+/Gram- Size: Cluster, Cocci. Coagulase test: +ve, Catalase test: +ve, Casein hydrolyses test: +ve, Citrate utilization test: +ve, Urease test: +ve, Methyl Red test: -ve, Voges-Proskauer test: +ve, Nitrate reduction test: +ve, Carbohydrate utilization test: Glucose, Lactose, Sucrose, D-Mannitol: +ve, Oxidase test: -ve, Indol test:-ve.

Fig 8: Antimicrobial Testing of Serum against *Staphlococcus aureus*

Fig 9: Skin irritation test: A) on applying, B) after 2 hrs

DISCUSSION

1. Extraction

Extraction of essential Phytochemicals by vortexing the *Aloevera* leaves powder& *Cinnamommum cassia* bark powder in methanol is done because we are not heating it so there no changes of destroying of essential phytochemicals of both plants parts.

2. Phytochemical Tests

Phytochemical tests showed good result, in which essential Phytochemicals consists of Phlobatannins, Carbohydrate, Flavonoid, Alkaloids and triterpenoids which are present in moderate amount.

3. Quantitative Phytochemicals Analysis

Quantitaive Phytochemicals of Carbohydrate, tannins, phenols, flavonoids good amount of Phytochemicals.

4. Biochemical Test of Bacteria:

Staphlococcus aureus is gram positive, cocci shaped, coagulase, catalase, urease, carbohydrate, casein, nitrate, citrate are positive. *Staphylococcus aureus* which colonize easily on wounded skin and lead to wound infection.

5. Formulation of Polyherbal Serum

The physical appearance of the formulation was checked, as sample were translucent, smooth and non-greasy on application, slightly glossy in nature.

6. Invitro Evaluation of Polyherbal Serum Sample

- The pH of the formulation was determined and was laid in 5.5 to 6.0 and found to be suitable for application on skin, because in range to apply.
- The results of spreadability and homogeneity showed good results, test showed no lumps and aggregates.
- The skin irritation test was carried out on human volunteers for formulated serum, as no lesions or irritation was observed.

CONCLUSION

Results of the present study revealed that prepared polyherbal gel contains methanolic extracts of *Alovera* leaves, *Cinnamommum cassia at* concentration of 50% and 9% and Physical Analysis and stability studies of the prepared gel proved potency and efficacy. The effective activity exhibited by the polyherbal formulations may be attributed to the synergistic action of plant constituents present in the formulation. The high amount of plant extracts increased antimicrobial activity of the formulation. In process of wound healing these formulations can be used safely on wounded human skin. It will enhance the process of healing due to presence of plant extract. It addition, research studies for future perspective, to prepare polyherbal serum because of cost effective, stable and most of other medicines, creams, sprays are becoming resistant to bacteria like *Staphylococcus aureus* .

REFERENCES

1. G.Dehel., G. Nadeeshani Dilhara., D. Rathnayaka Mudiyanselage., A. Don Chandana ., W.Rathnayaka Gamlathge Saman., P. Gamika A., S. Takao. (2022). Global Perspective of Plant-Based Cosmetic Industry and Possible Contribution of Sri Lanka to the Development of Herbal Cosmetics. Evid Based Complement Alternat Med. 9940548. Published online 2022 Mar 4. doi: 10.1155/2022/9940548, PMCID: PMC8916882.
2. Sasidharan, S., Joseph, P., & J. (2014). Formulation and evaluation of fairness serum using polyherbal extracts. Internal Journal of Pharmacy, 105-112.
3. K.Priyanka Kumari., L.Suaib., M. Abha.,Daru. (2019). Application of the combinatorial approaches of medicinal and aromatic plants with nanotechnology and its impacts on healthcare. Jun; 27(1): 475–489. Published online 2019 May 25. doi: 10.1007/s40199-019-00271-6. PMCID:PMC6592997.
4. Jamshidi-Kia, F., Lorigooini, Z., & Amini-Khoei, H. (2018). Medicinal plants: Past history and future perspective. Journal of Herbmed Pharmacology, 7(1), 1-7.doi:10.15171/jhp.2018.01.
5. Z.Chunling., F. Linhong.,F. Shunming., W. Jiaqi.,L. Ting., T. Yu., C. Zhimin., Y. Lingying. (2019). *Cinnamomum cassia* Presl: A Review of Its Traditional Uses, Phytochemistry, Pharmacology and Toxicology . Molecules. Oct; 24(19): 3473. Published online 2019 Sep 25. doi: 10.3390/molecules24193473. PMCID: PMC6804248
6. R.Javad Sharifi., D. Abhijit.,K. Niranjan.,S. Shabnum., O. Nasreddine El., S. Bahare.,G. Tamar., S. Nathália Cristina Cirone . (2021). *Cinnamomum* Species: Bridging Phytochemistry Knowledge, Pharmacological Properties and Toxicological Safety for Health Benefits. Front Pharmacol. ; 12: 600139. Published online 2021 May11. doi: 10.3389/fphar.2021.600139. PMCID: PMC8144503.
7. Zaidi, S. F., Aziz, M., Muhammad, J. S., & Kadowaki, M. (2015). Diverse pharmacological properties of Cinnamomum cassia: A review. Pak. J. Pharm. Sci., 1433-1438.
8. S.Marta.,B. Elena González., I. Irene., M. Pilar Gómez-Serranillos. (2020). Pharmacological Update Properties of ***Aloe Vera*** and its Major Active Constituents Molecules. Mar; 25(6): 1324. Published online 2020, Mar13. PMCID: PMC7144722.
9. S.Sachin K., S. Jyoti., Gokhale, M.Mehrajfatema Z., K. Vrinda R., Sonal Patil.(2021). A comprehensive overview of functional and rheological properties of **aloe vera** and its application in foods. J Food Sci Technol. Apr; 58(4): 1217–1226. PMCID: PMC7925795.
10. Ojha, S., Sinha, S., Chaudhuri, S. D., Chadha, H., Aggarwal, B., Mahor, S., . . . M. (2017). Formulation and evaluation of face serum containing Bee venom and aloe vera gel . World Journal of Pharmaceutical Research, 1100-1105.
11. V.Jelle., R. Dina., S. Kristin., T. Leen., N. Nicole., S. Bret., B. Willem J., W.van., K. Surbhi Malhotra. (2020). Exploring Virulence Factors and Alternative Therapies against Staphylococcus aureus Pneumonia. Toxins (Basel) 2020 Nov; 12(11): 721. PMCID: PMC7698915.
12. A.Christina Osei., O.Fredrick William Akuffo., E. Philomena., A. Ama Kwansima., G. Rita Akosua., A. Edem Makafui. (2021). Formulation and In Vitro Evaluation of Oral Capsules from Liquid Herbal Antimalarials Marketed in Ghana. J Trop Med. 2021; 2021: PMCID: PMC7834817.
13. I.Mihael Cristin., B. Anthony. (2021). Chemical Authentication of Botanical Ingredients: A Review of Commercial Herbal Products. Front Pharmacol. 2021; 12: 666850. PMCID: PMC8082499