Citation on the Research Work of the Applicant duly signed by the Nominator (Max. 300 KB) *

I would like to nominate the research work entitled ahead for the said award. **"In- vitro bio-relevant media and time simulation probiotic proliferation methodology to determine prebiotic potentials of flaxseed powder."** (Highlights provided at the end)

Presently Dr. Gitanjali is focused on plant seed prebiotics, probiotics, postbiotic excipients/ components, fermentation and agro-waste having similar properties, etc. Before beginning the comments on the importance of the research work under consideration for the said award I would like to focus on journey of applicant till this work which is published and her target beyond.

Being fellow professional I have been close observer of the applicant, It is great honour to disclose the research journey of the Applicant Dr. Gitanjali. She deeply experienced and believes that the unawareness regarding the human chemical/hormonal/ micro flora robotics is taking the human health towards the autoimmune conditions which could be associated with any anatomical system, any organ leading to dreadful inflammatory disorders like arthritis, celiac disease, obesity, diabetes etc. She says," take care of your micro flora, it will take care of your health". One of her talks on Microflora management and health very well explains how Stress and Food are the important parameters playing role in keeping human health homeostasis in place. https://youtu.be/0Wk-fYUl2_A?t=1h9m39s. Her team's winner poster supports the same. DOI:10.13140/RG.2.2.26557.13287 (https://www.researchgate.net/publication/358164292_Gut_Microflora_Awareness_As_Health_Regulator_A_Survey_Based_Statistical_Interpretations)

Being a person of medical basic sciences understanding and pharmaceutical professional background she is moving ahead exploring some good aspects related to food. Wherein we can say her research is taking journey from "Food to feed and feed to medicine". She works with strong belief- 'Feed the feeder and feeder will feed you justifying good health'. In simple language it means , feed your gut flora, it will ultimately take care of health homeostatic biochemical pathways, in turn keeping you healthy. Apart she believes in basic understanding of the concepts, value additions to explore perfectly in the field she is working.

Her research began in 2009-2010 with versatile areas like dosage form development, Quality by design, solubility enhancement, method development, biopharmaceutical pharmacokinetic aspects etc. https://www.ejmanager.com/mnstemps/82/82-1457672904_TYP.pdf

doi:10.5530/ijper.55.3.144,

http://impactfactor.org/PDF/IJDDT/6/IJDDT,Vol6,Issue2,Article1.pdf

Further being Pharma professional she got into development, isolation and characterization of Plant seed excipients with M.pharm research students under her guidance. She worked on various seeds like *Mucuna Pruriens,Flax Seeds, Fenugreek Seeds, Plantago Ovata, Oscimum Basilicum etc* through excipient point of view. For her research she received **Pharma Excipients poster award 2018 carrying cash prize of 1500€** on global basis among 35 poster all around the world having poster entries from countries like Germany, France, Italy, Belgium, USA, England, India Etc. Some of projects were sponsored by companies like Colorcon, BASF, GSK etc. Pharma Excipients International AG 6312 Steinhausen / Switzerland Project title: Pl ant Seed Component s as Phar mac eut i c al Exc i pi ent s : Gi v e a t hought ! https://www.pharmaexcipients.com/poster/poster-award-2018-winners/

https://drive.google.com/file/d/1uepGeWeaeuL22pWgYNh_qR2iqC4PJnJ5/view?usp=sharing

https://drive.google.com/file/d/1oOwZfk6YsTJRjhOQOvcOPHiFTqhXd6kK/view?usp=sharing

Simultaneously through the studies on biopharmaceutical aspects of these excipients she also focused on rule of thumb for excipient ability, based on her pharmacokinetic understandings of these plant seed excipients under study. She grabbed Second Prize for oral presentation, International Conference on Emerging Trends in delivery of Phytoconstituents and Ethnopharmacology-validation of traditional medicine-II.,Organized by Poona College of Pharmacy, Bharati Vidyapeeth, Pune, India, AICTE and Society for Ethnopharmacology India-Pune Chapter on 29-11-2019 to 30-11-2019 at Poona College of Pharmacy, Bharati Vidyapeeth, Pune, India, Determinants of Functionality Predictions for Dosage Forms Developed Using Natural Seed Excipients: 'Experimental Case Reports' https://drive.google.com/file/d/1hYrgnq6ffIYvI-XdMUesF6fnnD__-7oj/view?usp=sharing

https://drive.google.com/file/d/1TQdJHDN8B0VEABemB45GkJ9na-cegt87/view?usp=sharing

Later She started with project on Dragon fruit peel pectin isolation and characterization without intention to work on concept prebiotic, but in the same work accidently she entered into it. Her team grabbed Special Appreciation Award Abhikalp 2019, Design Competition for innovative projects and proof of concept development, 6th and 7th march 2019. Savitribai

phule Pune University Pune design innovation centre, in association with MHRD. (Dragon fruit peels pectin in the development of prebiotic films) https://drive.google.com/file/d/15Y2kPrI-6w72lZbokCREjU7ej5xLf0RH/view?usp=sharing.

She started improving her understanding in the field of prebiotics, probiotics, postbiotics, fermentation, human health, dysbiosis, human health homeostasis and microflora management etc. Then she targeted her focus towards prebiotic pharmaceutical excipients. Further Flax Seeds and Ragi Seeds were considered again for further research work on Prebiotic and Probiotics aspects. As an outcome two excellent research outputs were **an edible prebiotic film and its preparation using Ragi Whole Seed (Sprouted) Powder for which she filed patent which is being published(2022).** Work on Ragi is further continued by her through another aspect of Bioactive peptides and its understanding.

https://iprsearch.ipindia.gov.in/PatentSearch/PatentSearch/ViewApplicationStatus

https://drive.google.com/drive/folders/1GmjZ8-XQZPKNp-c3t2VtZXLL5Q20V2pE?usp=sharing

Whereas second research output was microbiological assay methodology was developed by her along with student team under her guidance predicting the performance of Prebiotics as well as Marketed probiotics in Human Body.

In- vitro biorelevant media and time simulation probiotic proliferation methodology to determine prebiotic potentials of flaxseed powder. https://doi.org/10.1016/j.bcdf.2022.100335

https://drive.google.com/file/d/1tvGYjwMAoiSfW9OOu671__uOchM96raW/view?usp=sharing

https://docs.google.com/document/d/1vTFH1ShWGnEZm742iGVMthvfR1j8kJ2j/edit?usp=sharing&ouid=106962687213151518134&rtpof=true&sd=true

For the said work she received excellent comments through the reviewers when the manuscript was under consideration for publication in the journal. One of the reviewers commented that Reviewer #2: *"Originality: this is an original study that was designed to investigate whether supplementation of ground flaxseed could stimulate probiotic proliferation during antibiotic treatment in vitro. The implications of this study could have relevance for recommendations on how probiotics are prescribed during or after antibiotic therapy. Also, this work*

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demonstrated that inclusion of flaxseed may efficiently optimize the growth potential of probiotics to a higher degree than without synbiotics. Scientific quality: This study carried out careful enzymatic assays, sub-culturing of probiotic bacteria, and proliferation assays."
https://drive.google.com/drive/folders/1MillpYK1XI7_yfnIAXjRsfXBM-gzPIHD?usp=sharing

Highlights and important findings of Present research work makes it more important and I sincerely feel it should reach to maximum readers: These findings would definitely guide Physicians prescribing marketed probiotics to patients https://doi.org/10.1016/j.bcdf.2022.100335

- Gastric enzyme pepsin has an inhibitory effect on growth of spores as observed in acidic condition
- One very important observation is that simulated intestinal pH as well as simulated acidic pH with or without enzymes does not support the growth of spores (Bacillus coagulans SNZ 1969) as well as culture (Bacillus coagulans SNZ 1969 may be indicative of growth media requirement for the incubation and growth of the spores and culture.
- The real time bio-relevant media digestion study shows that presence of antibiotic (Azithromycin) does not support the growth of probiotic spores(Bacillus coagulans SNZ 1969)and probiotic cultures Bacillus coagulans SNZ 1969) without the presence of growth media components.
- In case of fermented flaxseed powder in the presence of citric acid even acidic condition with enzyme pepsin supports the growth of probiotic spores.(Bacillus coagulans SNZ 1969).
- In case of real time bio-relevant media simulation, fermented product shows the supportive nature for the growth of probiotics.(Bacillus coagulans SNZ 1969) as well as antibiotic (Azithromycin) effect has found to be diminished as the scanty growth of the species is being observed.
- Fermented flaxseed powder could be effective post biotic supplement which could be explored further in post biotic supplement development.
- It has been observed in present study that factors like gastrointestinal pH, transit time, gastrointestinal fluid composition and presence of prebiotics, fermentation etc play very important role in proliferation and gastrointestinal colonization of orally supplied probiotics as part of the treatment strategy

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- The research findings justify the importance of synbiotic and postbiotic supplements as the part of treatment and prescription strategies in gut flora microbial dysbiosis caused by antibiotics rather than probiotic supplements alone.
- Or probiotics should be prescribed after completion of antibiotic therapy with proper instruction to consume probiotics with prebiotic dietary ingredients.

Based on the concept She further worked on garden cress seeds, Onion peel agro waste to explore the prebiotic and probiotic potentials wherein she came up with excellent finding. Publications of the research is in process.

She developed Prebiotic and probiotic base feed for fish using agricultural and municipal vegetable waste. Wherein it is observed that the said feed is developed by unique calculation methodology. It is more digestible and cost effective in comparison to marketed feeds which are prepared by specially grown grains. Whereas the developed feed has excellent prebiotic and probiotic potentials. (Patent filing in process) _The said project was also considered and reached the grand finale of Smart India Hackathon 2022.
https://drive.google.com/drive/folders/1QVxMftxIHT_qZ9IDgGJXdDplowNXz_GI?usp=sharing

Ongoing projects applications are

1. In -vitro Human Bio- simulation studies to evaluate, characterize, and understand the role of plant seed endophytes as probiotics to explore the potentials of seeds as natural sources of synbiotics in gut flora management. The project has been forwarded to SERB power fellowship award. It is under evaluation
2. Nanotechnology-based approach to modulate and evaluate the bioactive peptides from selected plant seeds for their anticancer and antimicrobial potentials along with dosage form design, and optimization with targeted drug delivery aspects.Project submitted to CSIR-Special call for research grants for women scientist.
3. Preclinical Studies to Understand and Design Functional Treatment Options for PCOS through Gut Flora Management. Project submitted to DST-SEED

With this and many other research plans applicant is working with full determination to reach the destination. Her research is worth considering for the said award.

Regards

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