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Development and Evaluation of Herbal Cognitive and Eye Health Gummies: A Natural Nutraceutical Approach

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ABSTRACT

Herbal gummies are an attractive nutraceutical dosage form for delivering plant-derived ingredients intended to support eye and cognitive health. The present work describes the formulation and proposed evaluation of a semi-herbal eye and brain health gummy containing lutein, pumpkin seed extract, blueberry extract, ginkgo biloba extract, moringa powder, pectin, honey, stevia and blueberry flavour. The formulation was designed as a 50 g laboratory batch after removal of zinc citrate, sodium citrate and citric acid. Pectin was used as the gelling agent, while honey and stevia contributed sweetness and palatability. Lutein and blueberry extract were incorporated for their relevance to ocular antioxidant support, while ginkgo biloba and moringa were included as botanical components associated with cognitive and antioxidant applications. Evaluation parameters include organoleptic properties, weight variation, texture, thickness, pH, moisture content, content uniformity, dissolution, taste, microbial quality and stability. Molecular docking information adapted from the supplied reference format was included for selected phytoconstituent–target interactions, particularly lutein with VEGFR2 and ginkgolide A with MAPK14. The revised formulation requires experimental evaluation before definitive performance or safety claims can be made.

Keywords: Herbal gummies, lutein, blueberry extract, ginkgo biloba, moringa, eye health, cognitive health, nutraceutical, molecular docking.

1. Introduction

Increasing screen exposure and demanding cognitive activities have increased interest in convenient nutritional products intended to support eye and brain wellness. Conventional tablets and capsules may be less attractive to some consumers because of swallowing difficulty and poor palatability. Gummies provide an appealing alternative because they can combine functional ingredients with a chewable dosage form and pleasant flavour.

The present formulation combines selected botanical and nutritional ingredients in a gummy matrix. Lutein is included as an eye-health ingredient, while blueberry extract provides anthocyanin-rich botanical material. Ginkgo biloba and moringa powder contribute plant-derived constituents with antioxidant and cognitive-health relevance. Pectin provides the gummy structure, while honey and stevia improve taste and acceptability.

2. Literature Review

Lutein and related carotenoids have been widely investigated in relation to retinal and macular health. Dietary and lifestyle factors can influence ocular comfort and visual function, particularly in individuals with prolonged digital-device exposure. Blueberry-derived anthocyanins have also been investigated for antioxidant and vascular effects.

Ginkgo biloba is a commonly studied botanical ingredient in products intended for cognitive wellness. Moringa oleifera contains vitamins, minerals and phytochemicals and has been reviewed for its nutritional and medicinal potential. Pectin is widely used as a pharmaceutical and food gelling agent and is suitable for gummy-type preparations.

3. Aim

To formulate and evaluate a semi-herbal gummy preparation containing selected botanical ingredients for potential eye and cognitive health applications.

4. Objectives

• To formulate a 50 g semi-herbal gummy preparation using lutein, blueberry extract, ginkgo biloba extract, pumpkin seed extract and moringa powder.

• To develop a palatable gummy matrix using pectin, honey, stevia and blueberry flavour.

• To evaluate the prepared gummies using suitable physical, physicochemical, performance and microbiological parameters.

• To incorporate molecular docking information for selected phytoconstituent–target interactions using the supplied reference format.

• To assess preliminary formulation stability and identify parameters requiring further optimization.

5. Materials and Methods

5.1 Materials

The formulation contains lutein, pumpkin seed extract, blueberry extract, ginkgo biloba extract, moringa powder, pectin, honey, stevia, blueberry flavour and purified water. Zinc citrate, sodium citrate and citric acid were excluded from the revised formulation.

Ingredient	**Quantity for 50 g**	**Function**
Lutein	0.12 g	Eye-health active / carotenoid
Pumpkin seed extract	1.50 g	Botanical nutritional ingredient
Blueberry extract	2.50 g	Anthocyanin-rich botanical / antioxidant
Ginkgo biloba extract	0.50 g	Botanical cognitive-health ingredient
Moringa powder	0.90 g	Nutritional botanical / phytochemical source
Pectin	5.50 g	Gelling and structuring agent
Honey	12.00 g	Sweetener and palatability enhancer
Stevia	0.08 g	High-intensity sweetener
Blueberry flavour	0.40 g	Flavouring agent
Purified water	26.50 g	Vehicle / processing medium
Total	50.00 g	—

5.2 Role of Each Ingredient

Ingredient	**Purpose / role**
Lutein	A carotenoid selected primarily for its relevance to retinal and macular health.
Pumpkin seed extract	Provides plant-derived nutritional and phytochemical constituents.
Blueberry extract	Provides anthocyanin-rich botanical material with antioxidant relevance.
Ginkgo biloba extract	Provides standardized botanical constituents commonly investigated for cognitive health.
Moringa powder	Provides plant nutrients and phytochemicals and supports the herbal/nutritional character of the formulation.

Ingredient	Purpose / role
Pectin	Forms the gummy gel matrix and contributes to texture.
Honey	Provides sweetness, body and improved palatability.
Stevia	Provides sweetness at a low concentration.
Blueberry flavour	Improves sensory acceptability and masks herbal notes.
Purified water	Acts as the processing medium and is removed/controlled during gummy preparation.

6. Method of Preparation

• Accurately weigh all ingredients required for the 50 g batch.

• Disperse pectin in a suitable quantity of purified water with controlled heating and continuous mixing.

• Add honey and stevia and mix until a uniform base is obtained.

• Prepare the botanical ingredients separately and incorporate them gradually into the gummy base under controlled mixing.

• Add lutein and other sensitive ingredients under conditions minimizing excessive heat exposure.

• Add blueberry flavour near the end of mixing.

• Transfer the homogeneous mass into suitable moulds and allow it to set.

• Remove the gummies from the moulds, inspect them visually and pack them in an appropriate moisture-protective container.

7. Evaluation Tests

• Appearance, colour, odour, texture and taste

• Weight variation and thickness

• pH

• Moisture content

• Content uniformity / active-content assessment where an appropriate validated method is available

• Dissolution or release behaviour

• Microbial limit testing

• Stability assessment under selected storage conditions

8. Molecular Docking Study

The molecular docking section follows the supplied reference article format. Docking findings are computational predictions and should not be interpreted as experimental pharmacological confirmation.

Ligand / constituent	Target	Reported docking / interaction finding
Lutein	VEGFR2	Best reported docking score −11.2 kcal/mol at CurPocket C4

Ligand / constituent	Target	Reported docking / interaction finding
Ginkgolide A	MAPK14 / p38 MAPK	Qualitative predicted interaction
Cyanidin	VEGFR2	Qualitative predicted interaction

The docking observations provide a computational perspective on possible ligand–target interactions. The results should be interpreted cautiously because docking scores depend on the selected protein structure, binding pocket, ligand preparation and computational protocol.

9. In-Silico Toxicity Assessment

The supplied reference article reports preliminary computational toxicity observations for selected compounds. These predictions are not a substitute for experimental toxicology or clinical safety evaluation. Compounds not present in the final revised formulation should not be interpreted as toxicity results for the final product.

Compound / constituent	AMES	hERG-I	hERG-II	Hepatotoxicity	Skin sensitization
Lutein	Negative	Negative	Positive	Not predicted	Not predicted
Ginkgo biloba constituent	Negative	Negative	Negative	Not predicted	Not predicted
Blueberry constituent	As reported in reference	—	—	—	Experimental confirmation required

10. Results and Discussion

The revised formulation has a theoretical batch size of 50 g. Zinc citrate, sodium citrate and citric acid were removed, and moringa powder was incorporated. The quantity of moringa powder used in this draft is 0.90 g to maintain the 50 g batch size; this quantity should be replaced by the experimentally selected quantity if a different batch composition was actually prepared.

Evaluation parameter	Result / status
Appearance	Excellent
Colour	Pink-red
Texture	Soft and chewy
Weight variation	~5%
Thickness	Enough
pH	3 to 4
Moisture content	18-20%
Content uniformity	Uniform
Stability	No major significant changes occurred

Because the revised formulation differs from the earlier formulation, previous experimental values should not be transferred to this batch without confirmation. Experimental results obtained from the final prepared batch should be entered in the table before submission or publication.

11. Advantages

• Chewable and potentially easier to administer than conventional solid dosage forms.

• Combines multiple plant-derived ingredients in a single formulation.

• Pleasant flavour and sweetness may improve consumer acceptability.

• Pectin provides a suitable gummy matrix.

• Can be developed as a convenient nutraceutical dosage form.

12. Applications

• Nutraceutical and wellness products intended for eye-health support.

• Botanical cognitive-health formulations.

• Convenient chewable supplement formats.

• Potential use as a prototype for further formulation and stability studies.

13. Conclusion

A semi-herbal eye and cognitive health gummy containing lutein, pumpkin seed extract, blueberry extract, ginkgo biloba extract and moringa powder was designed in a 50 g laboratory formulation. Zinc citrate, sodium citrate and citric acid were excluded from the revised composition. The formulation uses pectin as the gelling agent and honey, stevia and blueberry flavour to improve palatability. Molecular docking information provides preliminary computational support for selected ligand–target interactions; however, definitive claims require experimental validation. Further work should focus on physicochemical evaluation, active-content standardization, microbiological quality, stability and appropriate safety assessment.

14. Future Scope

• Optimization of the gummy texture, flavour and moisture content.

• Standardization and assay of selected active constituents.

• Long-term and accelerated stability studies.

• Detailed in-vitro antioxidant and biological activity studies.

• Further molecular docking and molecular-dynamics studies using validated protocols.

• Appropriate toxicological and clinical evaluation before any therapeutic or disease-prevention claims.

15. Conflict of Interest

The authors declare that there is no conflict of interest associated with the preparation of this research work.

16. Acknowledgement

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17. References

1. Sheppard AL, Wolffsohn JS. Digital eye strain: prevalence, measurement and amelioration. BMJ Open Ophthalmology. 2018.

2. Coles-Brennan C, Sulley A, Young G. Management of digital eye strain. Clinical and Experimental Optometry. 2019.

3. Johnson EJ, et al. Dietary carotenoids and ocular health. Relevant nutritional/ophthalmic literature.

4. Nathan PJ, et al. Ginkgo biloba and cognitive function: clinical and pharmacological evidence.

5. Travica N, et al. Blueberry anthocyanins and health-related outcomes. Nutritional research literature.

6. Morris MC, et al. Nutritional factors and cognitive health. Relevant epidemiological literature.

7. Sriamornsak P. Chemistry of pectin and its pharmaceutical applications. Journal of Pharmaceutical Sciences and related literature. 2003.

8. Rowe RC, Sheskey PJ, Quinn ME, editors. Handbook of Pharmaceutical Excipients.

9. Kokate CK, Purohit AP, Gokhale SB. Pharmacognosy.

10. Trease and Evans. Pharmacognosy.

11. Indian Pharmacopoeia Commission. Indian Pharmacopoeia.

12. United States Pharmacopeia–National Formulary. USP–NF.

13. Trott O, Olson AJ. AutoDock Vina: improving the speed and accuracy of docking with a new scoring function. Journal of Computational Chemistry. 2010.

14. Banerjee P, et al. ProTox-II: a webserver for the prediction of toxicity of chemicals. Nucleic Acids Research. 2018.

15. Raies AB, Bajic VB. In silico toxicology: computational methods for the prediction of chemical toxicity. Wiley Interdisciplinary Reviews: Computational Molecular Science. 2016.

16. Yang H, et al. Computational approaches in drug discovery and target-based screening.

17. Gopalakrishnan L, Doriya K, Kumar DS. Moringa oleifera: A review on nutritive importance and its medicinal application. Food Science and Human Wellness. 2016;5(2):49–56.

18. World Health Organization. WHO good manufacturing practices for pharmaceutical products.

19. International Council for Harmonisation. ICH Q1A(R2): Stability Testing of New Drug Substances and Products.

20. International Council for Harmonisation. ICH Q2(R2): Validation of Analytical Procedures.

21. International Council for Harmonisation. ICH Q8(R2): Pharmaceutical Development.

22. FAO/WHO. Pectin specifications and related food additive guidance.

23. EFSA. Scientific opinion on lutein and related carotenoids.

24. National Institutes of Health. Relevant fact sheets on lutein/zeaxanthin, zinc and herbal supplements.