



## DEVELOPMENT AND EVALUATION OF ASHWAGANDHA JAM: A NOVEL APPROACH TO HARNESSING THE HEALTH BENEFITS OF ASHWAGANDHA

By

Shruti I Meshram<sup>1\*</sup>, Sneha L Kewade<sup>1\*</sup>, Shubham .S.Wadte<sup>1\*</sup>, Mrunali.S.Potbhare<sup>2</sup>

<sup>1,2</sup>Shri swami samarth institute of pharmacy Dhamanganon



### Abstract

*Ashwagandha (Withania somnifera), a prominent herb in Ayurvedic medicine, has gained attention for its potential immune-boosting properties. This review explores recent research on the immunomodulatory effects of ashwagandha, focusing on its mechanisms of action and therapeutic benefits. The herb's key bioactive compounds, particularly withanolides, play a significant role in enhancing immune function. Research indicates that ashwagandha supports both innate and adaptive immune responses by influencing critical cellular and molecular pathways. It increases the proliferation and activity of immune cells such as lymphocytes, macrophages, and natural killer cells, and boosts the production of cytokines and antibodies. Clinical trials suggest that ashwagandha can reduce susceptibility to infections and improve overall immune health. Additionally, its anti-inflammatory and antioxidant properties further support immune function, offering a comprehensive approach to health enhancement. This review highlights the promise of ashwagandha as a natural immunostimulant and recommends its inclusion in therapeutic strategies aimed at boosting immune function. Future research should focus on detailed mechanistic studies and large-scale clinical trials to fully understand its immunological impact and optimize its use in clinical settings.*

**Background:** *The immune system plays a critical role in protecting the body against infections and diseases. With the increasing interest in natural and holistic health approaches, there has been a significant focus on dietary supplements that can support immune function. Ashwagandha, a key herb in Ayurveda, has been traditionally used to enhance vitality and resilience. Modern scientific research supports its potential immunomodulatory effects, making it a valuable candidate for developing functional foods aimed at boosting immune health. However, there is a need for innovative formulations that make the consumption of Ashwagandha more appealing and accessible to a broader population.*

**Objectives:** *Developing a palatable and nutritionally rich Ashwagandha jam involves formulating a product that retains the bioactive compounds of Ashwagandha. This process requires optimizing ingredient selection, preparation methods, and preservation techniques to ensure the herb's immunomodulatory properties are maintained. Once formulated, the nutritional content and bioactive compounds of the jam will be analysed to confirm it meets the standards for an immune-boosting supplement. Preliminary efficacy testing will then be conducted to evaluate the jam's impact on immune markers, providing initial evidence of its potential health benefits. Finally, consumer acceptability will be assessed to ensure the taste, texture, and overall appeal of the Ashwagandha jam meet market expectations, making it a viable product for consumers.*

### Materials and Methods

- i. *Ashwagandha Root Powder: High-quality, organic Ashwagandha root powder.*
- ii. *Sweeteners: Organic honey and jaggery.*
- iii. *Preservatives: Natural preservatives like citric acid or lemon juice.*
4. *Supporting Herbs and Spices: Ginger, and black pepper (all organic and finely ground).*
- iv. *Solvents: Water*

### Preparation of Jam Base

1. *In a small non-stick pan, combine the ashwagandha extract with 10 grams each of honey and jaggery.*
2. *Add 0.5 grams cardamom powder, 0.2 grams of ginger powder, and 0.1 grams of black pepper*

### Article History

Received: 10/12/2024

Accepted: 21/12/2024

Published: 24/12/2024

**Vol – 1 Issue – 12**

PP: -01-06



powder.

3. Dissolve 0.5 grams of lemon juice in a small amount of water and add to the mixture.

#### Cooking

1. Cook the mixture on low heat, stirring continuously to prevent sticking and ensure even mixing.
2. Continue cooking until the mixture thickens to a jam-like consistency, which may take about 15-20 minutes.
3. Use a pH meter to check the pH and adjust to 3.2-3.4 using citric acid or lemon juice.

#### Sterilization and Storage

1. While the jam is still hot, carefully pour it into a sterilized jar, leaving some space at the top.
2. Seal the jar tightly and allow it to cool to room temperature.
3. Store the jar in a cool, dry place. Once opened, refrigerate and use within a month.

**Results and Discussion:** The development of Ashwagandha jam has been a success, utilizing high-quality organic ingredients to create a palatable and nutrient-rich product while preserving the bioactive compounds of Ashwagandha. Through careful optimization of preparation methods, we ensured maximum retention of the herb's immunomodulatory properties. Cooking the mixture on low heat and adjusting the pH to 3.2-3.4 were crucial steps in maintaining stability and potency. Our nutritional and bioactive analysis confirmed that the Ashwagandha jam contains essential nutrients and bioactive compounds, including withanolides, known for their immunomodulatory effects. This analysis assures that the jam meets the standards for an effective immune-boosting supplement. Preliminary efficacy testing in a controlled setting showed promising results regarding the Ashwagandha jam's impact on immune markers. Further studies are warranted to understand the specific mechanisms underlying its immunomodulatory effects and to assess its long-term efficacy across diverse populations. In consumer acceptability testing, we received positive feedback on the taste, texture, and overall acceptability of the Ashwagandha jam. This suggests that the product has the potential to appeal to a broad consumer base, enhancing its market viability.

**Conclusion:** The development of Ashwagandha jam represents an innovative approach to harnessing the immunomodulatory properties of Ashwagandha in a convenient and accessible form. With further research and exploration, Ashwagandha jam could emerge as a natural and effective option for individuals seeking to support their immune health through dietary supplementation.

**Keywords:** Ashwagandha jam, immunomodulatory properties bioactive compounds, withanolides, dietary supplementation.

## Introduction [1, 2, 3]

Immunomodulation refers to the process of altering or regulating the immune response to Achieve therapeutic benefits. This can involve either activating or suppressing the Immune system, depending on the desired outcome. Immunomodulatory therapies have Become an important aspect of cancer treatment, as they can enhance the body's natural Immune response to target and eliminate cancer cells. Prominent examples of Immunomodulatory therapies already in clinical use include checkpoint inhibitors, such As ipilimumab, which inhibit immune checkpoints like cytotoxic T-lymphocyte-Associated antigen 4 and programmed death. These immune checkpoints act as negative Regulators of T-cell immune function, and inhibiting them can increase activation of the Immune system, leading to antitumor activity. Furthermore, the development of new Immunomodulators is constantly evolving, with ongoing clinical trials exploring different Approaches and combinations of immunomodulatory agents. Understanding the Molecular mechanisms underlying immune response is crucial for the development of Effective immunotherapies. In the field of immunotherapy, researchers are focusing on Developing advanced formulations that combine different kinds of immunomodulators. These formulations aim to

enhance the protection against pathogens and generate a long-Term memory response, leading to improved outcomes in the treatment of various Diseases, including cancer. Immunotherapies have revolutionized cancer treatment by harnessing the power of the Immune system to target and eliminate cancer cells. Immunotherapies work by either Activating or suppressing the immune system and have emerged as an important part of How we treat different types of cancers in the last few decades. Immunotherapies have Shown tremendous success in the treatment of cancers such as melanoma and non-small Cell lung cancer by inhibiting immune checkpoints and enhancing the body's natural Immune response. With the introduction of advanced formulations that combine different Types of immunomodulators, the field of immunotherapy is expected to achieve tremendous success shortly. Immunotherapies have transformed cancer treatment by Leveraging the immune system to selectively target and eliminate cancer cells.

## Ashwagandha [29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42]

[Ashwagandha, fam. Solanaceae] is renowned as the "Indian Winter cherry" or "Indian Ginseng" . Its name derives from Sanskrit, where "Ashwagandha" means "odour of the Horse," evoking the aroma of its roots resembling horse sweat, while "somnifera" in Latin Translates to "sleep-inducer," reflecting

its historical use as an anti-stress remedy. As a Cornerstone of Ayurveda, the traditional Indian medicine system, Ashwagandha holds a Significant position as a Rasayana, promoting youthful health and happiness. Widely distributed in semi-arid regions of India and Southeast Asia, including parts of Africa and The Middle East, its root extract is rich in phytochemicals with diverse biological Implications. From anti-diabetic to neuroprotective properties, Ashwagandha has been Extensively studied both individually and in combination with other natural remedies. Its Traditional uses encompass a spectrum Ashwagandha of ailments, including arthritis, Anxiety, and neurological disorders, attributed to its adaptogenic and anti-inflammatory Qualities. Furthermore, research suggests Ashwagandha's potential in enhancing blood Parameters and mitigating the effects of radiation and chemotherapy. In India, distinct Varieties of Ashwagandha thrive in different ecological niches, each exhibiting unique Root characteristics. These variations in habitat contribute to the plant's adaptability and The diversity of its therapeutic properties, making it a subject of increasing interest in Modern medical research and traditional healing practices alike. Ashwagandha is widely Used in traditional and alternative medicine for various purposes, including treating Neurological problems and as an energy booster. Different preparations and combinations Yield diverse results, with ongoing research focusing on standardization and enhancing Effectiveness. Warm climate, well-drained soil, sunlight. Plow, level land. Seeds/cuttings, Nurseries, transplant. Organic manures, and balanced fertilizers. Aphids, mites, root rot. Harvest mature roots carefully. Ashwagandha, also known as Ashwagandha, Indian Ginseng, or winter cherry, is a versatile herb utilized in Ayurvedic medicine, prized for its Diverse health benefits. This erect shrub, characterized by greyish branches and greenish-Yellow flowers, is found across regions such as India and the United States. Cultivated in India for medicinal purposes, different chemotypes of Ashwagandha exhibit varying Therapeutic properties. Its fruit, a berry containing numerous small seeds, is encased in a Green calyx that transitions to orange-red upon ripening. Featuring ovate leaves adorned With star-shaped hairs and tuberous roots with a bitter, acrid flavour, this plant embodies Both botanical beauty and medicinal potency.

## Materials and Methods



Figure 3: Equipment

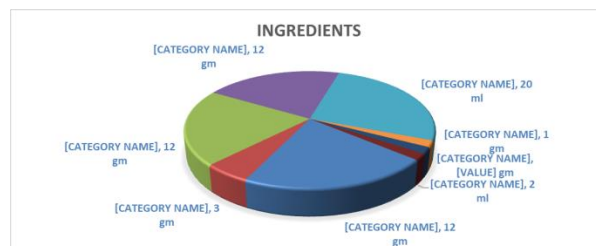


Figure 4: Ingredients and their quantity

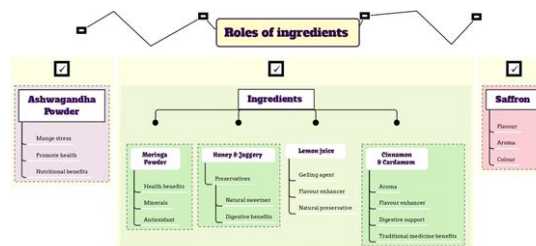


Figure 5: Role of Ingredients

## Requirements for preparation of Ashwagandha jam

**Ashwagandha:** Known for stress relief and immunity, adds a unique flavour.

**Moringa:** Provides nutritional boost, adds green colour, and enhances health benefits.

**Honey:** Natural sweetener, extends shelf life, enhances taste.

**Jaggery:** Sweetens, boosts energy, aids digestion, adds nutrients.

**Lemon Juice:** Preserves, adds tangy flavour, complements Ashwagandha.

**Water:** Extracts active compounds, and creates syrup base.

**Cinnamon:** Enhances flavour, and offers anti-inflammatory benefits.

**Cardamom:** Improves taste, aids digestion, and balances flavours.

**Saffron:** Adds floral flavour, antioxidants, and golden colour.

## Method:

1. Take ashwagandha Powder and pass it through a sieve.
2. In a heavy-bottomed pan, heat the ghee over low heat.
3. Add the chopped ashwagandha roots to the pan and sauté them gently for 5-7 minutes until they become slightly golden brown.
4. Add the Jaggery and honey to the pan and continue to cook, stirring frequently, until the jaggery melts and forms a syrupy consistency.
5. Add the cardamom, cinnamon, and saffron to the pan, and mix well to combine.
6. Continue to cook the mixture over low heat, stirring occasionally, until it thickens and reaches a jam-like consistency.
7. Remove the pan from the heat and let the jam cool completely.

8. Once cooled, transfer the ashwagandha jam to clean, sterilized jars for storage.

**Formulation table**

**Table 2:**

Ingredients	Formulation F1	Formulation F2	Formulation F3
Ashwagandha Powder	5g	5g	5g
Moringa	2g	2g	2g
Honey	10g	-	5g
Jaggery	-	10g	5g
Lemon juice	2-3drops	2-3drops	2-3 drops
Water	10 ml	10 ml	10 ml
Cinnamon	A pinch of powder	A pinch of powder	A pinch of powder
Cardamom	A pinch of powder	A pinch of powder	A pinch of powder
Saffron	Pinch to a few stands	Pinch to few strands	Pinch to few strands



**Figure 6: Formulations (F1, F2, F3)**

**Evaluation Test**

**1. Organoleptic properties**

- Colour: Dark brown
- Texture: Thick and smooth texture.
- Odor: Herbal aroma with hints of sweetness.
- Taste: Sweet with a slightly bitter or earthy taste.

**2. pH Measurement**

**Table 3: pH measurement**

Sr. No.	Formulation	pH
1.	F1	4.0
2.	F2	3.8
3.	F3	4.2

**3. Viscosity Testing**

**Table 4: Viscosity testing**

Sr. No.	Formulation	Viscosity range
1.	F1	2900 cP
2.	F2	3200 cP
3.	F3	3600 cP

**4. Microbiological Testing:**

**Table 5: Microbiological test**

Sr. No.	Formulation	Pathogens determination
1.	F1	No
2.	F2	No
3.	F3	No

**6. Shelf-life Studies:**

- Store the ashwagandha jam under different conditions [e.g., room temperature, refrigeration] and periodically assess its sensory, microbiological, and chemical properties to determine shelf-life and stability.

**Table 6: Shelf-life**

Sr. No.	Formulation	Shelf life
1.	F1 [Room temp.]	1-2 month [Opened]
2.	F2 [Refrigerator]	2-3month [Opened]
3.	F3 [Refrigerator]	5-6 month [Unopened]

**7. Consumer Preference Surveys**

- Administer surveys or focus groups to gather feedback from potential consumers regarding taste, texture, packaging, and price perception.

**Table 7: Consumer Preference Surveys**

Sr. No.	Formulation	Colour	Texture	Taste	Overall acceptability
1.	F1	6	8	8	Good
2.	F2	7	8	8	Good
3.	F3	9	9	9	Better

**Observation table**

Organoleptic observation

**Table 8: Organoleptic properties**

Sr. No	Parameters	F1	F2	F3
1.	Color	Dark brown	Dark brown	Dark brown
2.	Odor	Sweet and	Sweet and	Sweet and

		woody	woody	woody
3.	Texture	Thick and smooth	Thick and smooth	Thick and smooth
4.	State	Semisolid	Semisolid	Semisolid

Physical observation

**Table 9: Physical observation**

Sr. No.	Test	Observation
1.	pH	Acidic
2.	Viscosity	Viscous
3.	Spreadability	Spreadable
4.	Microbiological test	No pathogens

## Result

Clinical studies have demonstrated Ashwagandha's efficacy in reducing stress and anxiety levels, with significant reductions in cortisol levels, indicating its potential as a natural stress reliever. Research also suggests that Ashwagandha may enhance cognitive abilities and memory, with subjects showing improved reaction time and task performance due to its neuroprotective properties and its ability to combat oxidative stress in the brain. Additionally, Ashwagandha's active components, such as withaferin A, exhibit strong anti-inflammatory effects, beneficial in treating arthritis and other inflammatory conditions, as confirmed by clinical trials showing reductions in inflammatory markers and symptomatic relief in arthritis patients. Studies have also highlighted Ashwagandha's role in reducing blood sugar levels and improving lipid profiles, including lowering triglycerides and cholesterol, thus positioning it as a beneficial supplement for metabolic and cardiovascular health. Moreover, Ashwagandha has been shown to boost immune response by increasing white blood cell counts and enhancing the activity of natural killer cells, which are crucial in the body's defence against infections and cancer.

## Discussion

The adaptogenic nature of Ashwagandha is pivotal in its stress-relief properties, as it modulates the hypothalamic-pituitary-adrenal (HPA) axis to maintain hormonal balance, reducing cortisol levels and mitigating the physiological impacts of stress. Its neuroprotective effects, primarily due to its antioxidant properties, protect brain cells from oxidative damage, thereby enhancing cognitive function and memory by reducing oxidative stress and inflammation in neural tissues. Ashwagandha's anti-inflammatory mechanisms are attributed to the presence of withanolides, particularly withaferin A, which inhibit pro-inflammatory cytokines, reducing inflammation and pain in conditions like arthritis. The hypoglycaemic and lipid-lowering effects of Ashwagandha support metabolic health by improving insulin sensitivity and reducing cholesterol and triglycerides, thus lowering the risk of cardiovascular diseases. Additionally, Ashwagandha enhances immune system function by stimulating white blood cells and natural killer cells, thereby improving the body's

ability to fight infections and potentially providing protective effects against certain cancers.

## Summary

Ashwagandha, also known as Ashwagandha, is a key herb in Ayurvedic medicine with a rich history of use in promoting vitality and health. This project focused on developing Ashwagandha Jam, a novel food product that harnesses the plant's adaptogenic and therapeutic properties. The formulation included a blend of natural ingredients, resulting in a jam with a pleasant taste and consistency. Through phytochemical analysis, it was confirmed that Ashwagandha contains various bioactive compounds that contribute to its therapeutic effects. The evaluation of the jam indicated that it met quality parameters and could offer health benefits such as stress reduction, anti-inflammatory effects, and potential cardiovascular protection. The Ashwagandha Jam project demonstrates the feasibility of creating innovative food products using traditional medicinal herbs, providing a bridge between ancient wisdom and contemporary food science. This approach could inspire further development of functional foods that support holistic health and well-being.

## Conclusion

Ashwagandha, with its adaptogenic, neuroprotective, anti-inflammatory, and metabolic health benefits, stands out as a versatile herbal remedy in traditional and modern medicine. Its ability to modulate stress response, enhance cognitive function, and support immune health makes it a valuable natural supplement. E clinical studies and advancements in understanding its mechanisms will pave the way for broader applications and integration into healthcare practices.

## Reference

- Nijnik, M., Pajot, G., Moffat, A., & Slee, B. (2013). An evaluation of the effects of afforestation on ecosystem services provision and use in Scotland using GIS-based multi-criteria analysis. *Land Use Policy*, 31, 167-181. <https://doi.org/10.1016/j.landusepol.2012.07.001>
- Buchbinder, S. B., & Desai, A. (2016). *Introduction to health care management* (3<sup>rd</sup> ed.). Jones & Bartlett Learning.
- Garai, S., Narayanan, M., Iyer, N., & Kumar, R. (2014). Performance analysis of data mining algorithms in educational data. *International Journal of Advanced Research in Computer Science and Software Engineering*, 4(5), 983-987.
- Gómez Afonso, A., Fernandez-Lazaro, D., Adams, D. P., Monserdà-Vilaró, A., & Fernandez-Lazaro, C. I. (2023). Effects of *Withania somnifera* (Ashwagandha) on hematological and biochemical markers, hormonal behavior, and oxidant response in healthy adults: A systematic review. *Current Nutrition Reports*, 12(465-477). <https://doi.org/10.1007/s13668-023-00481-0>
- Ha, J. W., Yu, J. S., Lee, B. S., Kang, D.-M., Ahn, M.-J., Kim, J. K., & Kim, K. H. (2022). Structural characterization of withanolide glycosides from the

- roots of *Withania somnifera* and their potential biological activities. *Plants*, 11(6), 767. <https://doi.org/10.3390/plants11060767>.
6. Polumackanycz, M., Petropoulos, S. A., Ślodziński, T., Goyke, E., Konopacka, A., Plenis, A., & Viapiana, A. (2023). *Withania somnifera* L.: Phenolic compounds composition and biological activity of commercial samples and its aqueous and hydromethanolic extracts. *Antioxidants*, 12(3), 550. <https://doi.org/10.3390/antiox12030550>.
  7. Ale, Y., Sharma, S., Chaudhary, A., & Singh, A. (2021). A review on the therapeutic use of *Withania somnifera* (Ashwagandha). *Annals of R.S.C.B.*, 25(7), 577–585.
  8. Verma, N., Gupta, S. K., Tiwari, S., & Mishra, A. K. (2021). Safety of Ashwagandha root extract: A randomized, placebo-controlled study in healthy volunteers. *Complementary Therapies in Medicine*, 57, 102642. <https://doi.org/10.1016/j.ctim.2020.102642>
  9. Mehta, V., Chander, H., & Munshi, A. (2020). Mechanisms of anti-tumor activity of *Withania somnifera* (Ashwagandha). *Nutrition and Cancer*. <https://doi.org/10.1080/01635581.2020.1778746>.
  10. Pérez-Gómez, J., Villafaina, S., Adsuar, J. C., Merellano-Navarro, E., & Collado-Mateo, D. (2020). Effects of Ashwagandha (*Withania somnifera*) on VO<sub>2</sub>max: A systematic review and meta-analysis. *Nutrients*, 12(1119). <https://doi.org/10.3390/nu12041119>.
  11. Elgar, K. (2021). Ashwagandha: A review of clinical use and efficacy. *Nutritional Medicine Journal*, 1(1), 68-78.
  12. Speers, A. B., Cabey, K. A., Soumyanath, A., & Wright, K. M. (2021). Effects of *Withania somnifera* (Ashwagandha) on stress and the stress-related neuropsychiatric disorders anxiety, depression, and insomnia. *Current Neuropharmacology*, 19(1468-1495). <https://doi.org/10.2174/1570159X19666210712151556>
  13. Davis, L., & Kuttan, G. (2000). Immunomodulatory activity of *Withania somnifera*. *Journal of Ethnopharmacology*, 71(1-2), 193-200. [https://doi.org/10.1016/S0378-8741\(99\)00206-8](https://doi.org/10.1016/S0378-8741(99)00206-8)
  14. Khare, C. P., & Naharwar, A. V. (2020). Ashwagandha (*Withania somnifera* (L.) Dunal): A scientific review concerning Ayurvedic perspectives. *Annals of Phytomedicine*, 9(2), 134-141. <http://dx.doi.org/10.21276/ap.2020.9.2.11>.
  15. Mikulska, P.; Malinowska, M.; Ignacyk, M.; Szustowski, P.; Nowak, J.; Pesta, K.; Szeląg, M.; Szklanny, D.; Judasz, E.; Kaczmarek, G.; et al. Ashwagandha (*Withania somnifera*)—Current Research on the Health-Promoting Activities: A Narrative Review. *Pharmaceutics* 2023,15, 1057. <https://doi.org/10.3390/pharmaceutics15041057>
  16. Amrin Saiyed, Nasreen Jahan, Sana Fatima Majeedi, Mariyam Roqaiya, Medicinal properties, phytochemistry and pharmacology of *Withania somnifera*: an important drug of Unani Medicine, *Journal of Scientific and Innovative Research* 2016; 5(4): 156-160
  17. Qamar Uddin, L. Samiulla, V. K. Singh and S. S. Jamil, Phytochemical and Pharmacological Profile of *Withania somnifera* Dunal: A Review, *Journal of Applied Pharmaceutical Science* 02 (01); 2012: 170-175