

# Role of *Ashwagandha* Incorporated Functional Foods for Betterment of Human Health: A Review

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**Abstract**—Increasing awareness about health among consumers, high cost of health care products and steady decrease in life expectancy result in increased demand for innovative functional foods incorporated by various medicinal plants. *Ashwagandha* (*Withania Somnifera*) is commonly called Indian Ginseng, Gandhpatri, *Asgandha*, is a value-based herb which has been used by human for more than 3,000 years and it is the oldest medicinal plant in the Ayurvedic medicine. *Ashwagandha*, has health benefits which are as follows such as it controls cholesterol levels, increases fertility in men, reduces anxiety, relieves stress, fights diabetes, controls hair fall, hinders, treat osteoporosis, rheumatic arthritis, treats cancer, increases blood production, prevents seizures, aids in muscle growth, stimulates the thyroid gland, reduces ocular diseases, anti-tumor, anti-inflammatory and antibacterial properties etc. *Ashwagandha* is used on a large scale for natural health supplement which balanced the tridosha (Kapha, Vata and Pitta) especially kapha and vata. Leaves and roots of *Ashwagandha* (dose: 3-6 gm) can be used in powder form or as it is in the food formulations. Several products are developing by researchers, incorporated with *Ashwagandha* such as shrikhand, namakpara, missi roti, chutney, muruku etc. to get medicinal benefits. The medicinal role of *Ashwagandha* is quite well explored by scientists but its applications in functional foods are very few. So, there is a need to explore the various methods to incorporate these functional medicinal compounds in the functional food to get maximum benefits for human health.

## 1. INTRODUCTION

*Ashwagandha* (*Withania Somnifera*) or Indian Ginseng or Gandhpatri or *Asgandha* is a value based herb which has been used by human for more than 3,000 years and it is the oldest medicinal systems in the Ayurvedic medicine. *Ashwagandha* is commonly found in all parts of India from the northern tropics to southern India [13-1]. Fruits like pomegranate [22], citrus fruits and *Ashwagandha* leaves and other food products i.e. chocolate are good source of bioactive properties [23]. The leaves and roots of *Ashwagandha* are mainly used for medicine and good source of dietary fiber (28.8%) and minerals (10.1%) apart from having with aferine A content of 0.16% [20]. Roots of *Ashwagandha* having many biochemical

heterogeneous alkaloids, is full of nutrients such as withanolids, acyl steryl glucosides, anferine, iron, lactones, nitrate, potassium, somniferine, sominine, tannins, tyrosine. *Ashwagandha*, also known as Indian ginseng has health benefits which are as follows such as it controls cholesterol levels, treats erectile dysfunction, increases fertility in men, reduces anxiety, relieves stress, fights diabetes, controls hair fall and hinders, treat osteoporosis and rheumatic arthritis, treats cancer, stimulates the thyroid gland, boosts immunity, increases blood production, prevents seizures, aids in muscle growth, reduces ocular diseases, anti-tumour, anti-inflammatory and antibacterial properties [19]. *Ashwagandha* is composed of several nutrients like glycowithanolides (antioxidants), potassium nitrate, iron, fatty acids, tannins, glucose, alkaloids and numerous other substances, as these compositions are rich sources of *Ashwagandha* [16]. Cereals are globally grown in abundant quantities and provide almost more than 70% of the energy needs of the people than any other crop. The cereal based products such as bread, cake; biscuits and cookies are widely consumed due to good nutritional profile and always act as an attraction point for food technologists to do any modification in it. Increasing awareness for consumer health, cost of health care and steady increase in life expectance result in the demand for innovative cereal based food products that improves consumer well beings [25-15]. WHO estimated that 80% of the population of developing countries still relies on traditional plant drugs for their primary health care needs [29-27] World Health Organization (WHO) and Food and Agricultural Organization (FAO) recommend consuming foods with low glycemic index as a part of healthy diets for the all age groups. The study was conducted to investigate the effect of *Ashwagandha* root powder has low glycemic index products based on blood glucose in healthy subjects [8]. Government of India started Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy (AYUSH) in year 2008, as part of a global strategy for brand-building of Ayurvedic medicine and

prioritized the promotion of *Ashwagandha* preparations in particular for attaining marketing authorizations as medicinal products in Indian markets. The *Ashwagandha* strategy was developed in collaboration with the International Trade Centre of UNCTAD (Geneva, Switzerland) [10]. Today, *Ashwagandha* can be found in some food products such as namakpara, missi roti, chutney and muruku etc. [29].

According to Goldberg, [14] stated that the addition of functional foods to their basic nutritive and natural value help us to function better and helping directly in prevention and treatment of illness and disease. According to and Alavi et al., [2-38], Singh, *et al.* and Gamlath [11] concluded that cooking is mostly used for continuous productions of some products such as breakfast, cereals and snack foods. However, a recent trend in food science and research is to improve the nutritional characteristics in new generation snacks.

*Withania somnifera* plant is rich in beneficial chemical compounds and about more than 80 compounds is well known [41]. Matsuda *et al.*, [28] reported and identified isolated some new compounds such as withanolids I, II, III, IV, V, VI and VII. Root parts rich in alkaloid and also collected from cultivated plants [33]. Sharma, [35] reported that the total alkaloid content in the roots of Indian types is in between 0.13 to 0.31%. Stem has low percentage of total A and D withanolids (0.055%) [12].

## 2. PLANT DETAILS:

### 2.1 Taxonomy:

<b>Kingdom</b>	:	<i>Plantae</i>
<b>Subkingdom</b>	:	<i>Tracheobionta</i>
<b>Superdivision</b>	:	<i>Spermatophyta</i>
<b>Division</b>	:	<i>Magnoliophyta</i>
<b>Subclass</b>	:	<i>Magnoliopsida</i>
<b>Order</b>	:	<i>Solanales</i>
<b>Family</b>	:	<i>Solanaceae</i>
<b>Genus</b>	:	<i>Withania</i>
<b>Species</b>	:	<i>Withania somnifera</i>

Medicinal plant category *Ashwagandha* is a perennial evergreen shrub [7]. *Ashwagandha* is commonly grown in moderate and drought condition and it is found in almost all region of India [35]. It's all parts i.e. roots, branches, leaf, flowers and fruits are used due to its wide range of health benefits and consumptions.

### 2.2 Cultivation and Harvesting

*Withania somnifera* is grown in a moderate environmental conditions especially semitropical region. Indian farmers also trying to cultivate these types of medicinal crops which are mainly cultivated in the moderate drought soils conditions (Rajasthan, Gujarat, Uttar Pradesh, Madhya Pradesh and Haryana etc). The mature seeds of *Ashwagandha* are used for

the cultivation in ending of summer and starting of rainy season. The neutral pH, nitrogen rich soil is suitable for the growth of *Ashwagandha* plant. The organic and nitrogen rich fertilizer is used for the formation of good quality and quantity roots of *Ashwagandha* plant [35]. The plant is harvesting in starting month of April [34]. Now a day it is cultivated around whole part of World.

## 3. Ashwagandha Root and Leaf Incorporated Products:

### 3.1 Extrudates

Choudhury *et al.*, [9] developed *Ashwagandha* fortified snacks and found more antioxidant as compared to control. The comparison of extrusion cooking of herbal snacks with traditional cooking process of dried products, the resulting of extrusion cooking was found more retention of bioactive compounds. The value addition processing of herbal antioxidant is promising area which is needed to be explored for commercial application.

### 3.2 Juices and Beverages

The study was done for develop a functional ready to serve (RTS) beverage blend using *Withania somnifera* (*Ashwagandha*) and *Solanum nigrum* (Makoi) separately with orange juice (*Citrus sinensis L.*). Both *Ashwagandha* fortified beverage blend and makoi fortified beverage was found more or less comparable quality characteristics both in fresh and in stored samples. The developed products were acceptable till 90 days when stored at room temperature. The results were found by researcher that antioxidant rich *Ashwagandha* (AFBB antioxidant activity: 899±22.4 µmol TE/100 gms) and *Solanum nigrum* (MFBB antioxidant activity: 750±21.8 µmol TE/100 gms) could be successfully utilized to develop functional fruit beverage to improve quality of nutrition in today's way of life [18].

### 3.3 Sweets products

A study reported that addition of 0.5 per cent *Withania Somnifera* powder to shrikhand has improved the organoleptic quality and the product was self stable and acceptable up to 52 days at refrigeration temperature [36]. Choudhury *et al.*, [9] was developed the cereal-legume based *Ashwagandha* root powder incorporated sweet *ladoo* and studied the sensory characteristics and nutritional composition such as crude fat, crude fiber, total dietary fiber and mineral content. The *laddoos* exposed that the variation in proportion of cereal-legume affected the sensory scores of the *laddoos* more than the level of *Ashwagandha* root powder incorporation it was a sweet product and minor bitter taste. The taste of *Ashwagandha* root powder was masked by sweetness of jaggery. As per sensory score i.e. overall acceptability of the *laddoos* adversely and incorporation of *Ashwagandha* root powder till the level of 5% was acceptable. The shelf life study indicated that the *laddoos*

can be stored for 30 days, which is best consumed within 15 days. The shelf life of these *laddoos* can be further increased by increasing the jaggery and fat content. The results of nutritional evaluation exposed that *Ashwagandha* root powder supplementation improved the nutritional as well as shelf-life of developed product. The study as a result suggest that *Ashwagandha* root powder supplementation can be used effectively as a source of value addition in sweet preparations to increase the fat, fiber and mainly the micronutrient content in addition to imparting beneficial medicinal properties.

### 3.4 Bakery and Cereal products

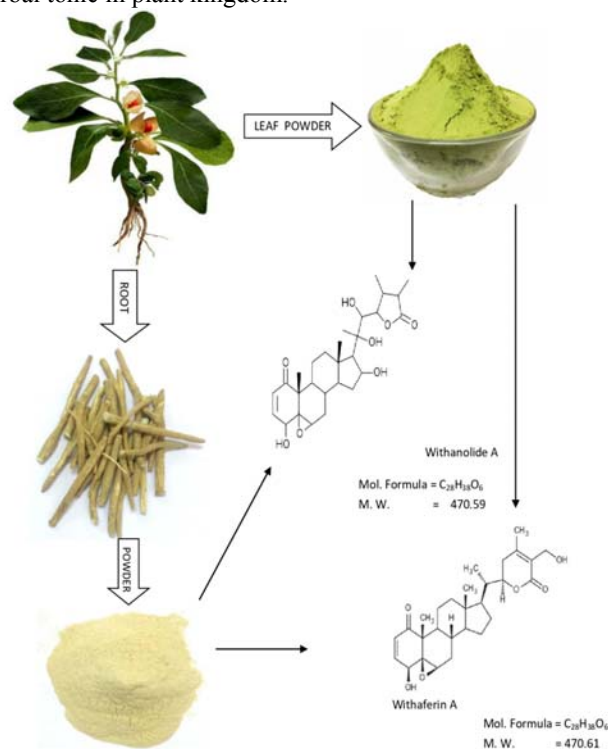
Sensory evaluation of the developed products by semi trained panels revealed that 1.5% level of incorporation of *Withania Somnifera* powder in sweet and salt biscuits and customer assessment exposed that 2.5% level of incorporation of *Withania Somnifera* powder was used in sweet and salt biscuits (blend of sorghum and wheat flour). The result of developed product was found by Sowmya, [40] Narayan, [29] satisfactory. However the addition of 5% level of *Ashwagandha* powder in Namakpara, Muruku, Pappu chakalu, and upto 10% in Missi roti and Chutney powder was acceptable. Anita et al. [3], worked on the development of herbal based functional food using *Ashwagandha* leaf powder and found the developed product have high nutritional value as compared to the control sample. The *Ashwagandha* based cookies was good source of number of bioactive components which will be helps in the improvement of overall health. Indu and Awasthi, [17] was studied and prepared the cereals-legumes incorporated biscuits using *Ashwagandha* root powder at different proportions (3%, 4% and 5%) and best combination was found at the level of 5 percent addition. The study was showed that enriched biscuits were rich of energy, minerals, fibers, protein and enhancing the medicinal properties. The *Ashwagandha* root powder (2%) added in the baked products such as flat bread and thepla and reported the lower down glycemic index which also lowers down the diabetes mellitus [8].

The Nutrients calculation of prepared products (Cheela and Cookies) showed that the protein, fat, crude fiber, energy, carbohydrate, iron, calcium and vitamin C content of the prepared products were increased by the incorporation of medicinal root powder with besan in cheela and with refined wheat flour in cookies. The antioxidant content such as total polyphenol and anti radical scavenging activity was also increased significantly in cheela and cookies. As the incorporation level of the dehydrated medicinal herbs leaves increased, the cost of prepared products decreased [24].

### 3.5 Dairy products

*Ashwagandha* extract in liquid or powder form may be added in dairy products and it provides the nutraceutical function. Pawar et al., [31] studied the incorporation of *Ashwagandha* powder, *vidarikand* and *shatavari* was found highest

antioxidant properties among the herbs. *Arjuna* herb incorporated ghee was developed by National Dairy Research Institute (NDRI) Karnal, India. The developed ghee functionality and stability against oxidation of fat was found better as compared to traditional ghee. The medicinal properties of *arjuna* extract is effective against cardiovascular disease [6]. Sharma and Vigyan, [37] was studied the *withania somnifera* are steroidal lactones, sitoindosides and steroidal alkaloids it is a immune boost application and most important herbal tonic in plant kingdom.



**Fig.1. Ashwagandha plant and its components Withaferin A and Withanolide A**

### 3.6 Health Benefits

The results were found that the product with 2% root powder incorporated product was more acceptable. The activity of *Withania somnifera* pharmacology has been attributed to two main withanolides, withaferine A and withanolide A (Fig. 1). *Ashwagandha* root powder can be used as a useful ingredient to produce low glycemic index (GI) food product with favorable sensory characteristics and too prove to be positive in the healing and/or hindrance of impair glucose acceptance, insulin resistance and in addition being an effective means of controlling glucose levels. Therefore, it is a vital role for healthy and nutritious products which may be beneficial in avoidance and managing of Type II Diabetes. *Ashwagandha* root powder based biscuits were found more suitable than *Ashwagandha* churan balls while *Ashwagandha* root powder

added beverage was not much acceptable. Value added products prepared by *Ashwagandha* root powder were more acceptable. Hence, there is a need to standardize and develop more value added products of *Ashwagandha* root powder based so, as to promote its health beneficial effects because despite of possessing great therapeutic value *Ashwagandha* cannot be consumed in raw form due to its bitter taste [39].

#### 4. Conclusion

Food is components which fulfill our daily energy needs and nutrition. The food products are fortified by natural herb (*Ashwagandha*) and its bioactive compounds effective in prevention and treatment of numerous diseases. In markets the value added products prepared by *Ashwagandha* root powder are more acceptable. Hence, there is a need to standardize and develop more value added products of *Ashwagandha* root powder based so, as to promote its health beneficial effects because despite of possessing great therapeutic value *Ashwagandha* cannot be consumed in raw form due to its bitter taste [39].

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