

# Antioxidant Rich Food Product Development for Women Suffering from PCOS

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## ABSTRACT

PCOS is becoming a major concern in India. PCOS (Poly-cystic ovarian syndrome) is a disorder caused by hormonal imbalance. It affects a large number of females between puberty and menopause. It affects one in every 15 females at their reproductive age worldwide (Manouchehri *et al.*, 2023). Females with PCOS have abnormal hormonal imbalances that affect the menstrual cycle, ovulation and conception. The present study was planned to develop a food product (chyawanprash) for females of reproductive age. Chyawanprash is a traditional and trusted recipe among Indians which is developed by combination of various ingredients rich in all the nutrients and antioxidants. In the present work 3 different compositions of chyawanprash were developed and subjected to sensory evaluation using 9 point hedonic scale rating method. The best composition was sent to food testing lab for further evaluation.

**Keywords :** PCOS, Chyawanprash, Antioxidants, Reproductive age females

## INTRODUCTION

PCOS has become a common disorder among teenagers. This disorder is caused by hormonal imbalance. It is a condition in which ovaries start producing excess male hormones called androgens. High level of androgen production in females causes imbalance of reproductive hormones. Females with PCOS suffer from irregular periods or no periods at all. Due to anovulation small cysts may develop on the ovaries (Lakshmi *et al.*, 2023). Women suffering from PCOS may have enlarged ovaries that contain little collection of fluid called follicles which are located in each ovary and can be seen during the diagnosis through ultrasound. PCOS is a major cause of female infertility (Cheng *et al.*, 2022). PCOS is so common, that it can be seen in maximum females in their reproductive phase. PCOS prevalence rate is higher in countries where obesity and type 2 diabetes are common. But still there is no exact cause known for PCOS (Bharali *et al.*, 2022). High levels of androgens are also

responsible for acne and excessive hair growth in females. Approximately all females suffering from PCOS are overweight and it is also very difficult for them to lose weight (Moran *et al.*, 2010). Skin darkening also known as acanthosis nigricans which means dark patches of skin appear in armpits, between legs, folds of neck and under the breast. Little flaps of extra skin called skin tags are visible in armpits or neck of PCOS patients (Ndefo *et al.*, 2013).

Chyawanprash is an ayurvedic health supplement which is a mixture of various herbs each having specific benefits.

The chyawanprash developed in this research consists of ingredients which are specifically helpful in managing the symptoms of PCOS. The ingredients used in chyawanprash are amla, guava, jaggery, dry ginger, cinnamon, turmeric, basil seeds, black pepper, shatavari, peanuts, sesame seeds, flax seeds.

Antioxidants play a major role in protecting against the symptoms of PCOS. This chyawanprash is prepared

with the ingredients which are loaded with antioxidants. This chyawanprash proved to be rich in vitamin c as well as total antioxidant.

Vitamin C is a potent antioxidant and it suppresses the chronic inflammation in PCOS. Amla and guava are richest in vitamin C so they are used as major part in this recipe. Being a water-soluble vitamin it helps in protection of DNA and protection of proteins and fat from oxidative damage. Oxidative damage interrupts the hormonal balance.

Vitamin C helps in improving the progesterone levels in women with PCOS. It also clears the skin and acne marks.

Quercetin is also a natural compound found in many fruits and it is an emerging drug in treating PCOS. Quercetin also works as antioxidant and helps in treating the symptoms of PCOS as it promotes ovulation, alleviates insulin resistance, alleviates chronic inflammation, reduces the level of serum androgen. Along with vitamin c amla and guava are rich in quercetin too.

Alpha lipoic acid is also suggested beneficial in treating PCOS as it majorly helps in improving insulin resistance. Flax seeds are rich in ALA so they are used in this recipe.

Coenzyme CoQ10 is a powerhouse of antioxidant. Peanuts are the excellent natural source of CoQ10, hence they are used in this recipe. It lowers the insulin levels and has surprising blood glucose balancing properties. A study published in Journal of Fertility and Sterility revealed that as an antioxidant CoQ10 has been linked to improving ovulation because it neutralises the free radical that damage egg quality. Iron deficiency is the major issue in PCOS and jaggery is the richest source of iron thus it alleviates this issue.

Shatavari has 2 major antioxidants. Asparagamine A and racemofuran. It helps in regulating the menstrual cycle, balancing the LH and FSH.

All the ingredients used in this recipe are rich in antioxidants that help in managing the major symptoms of PCOS.

## METHODOLOGY

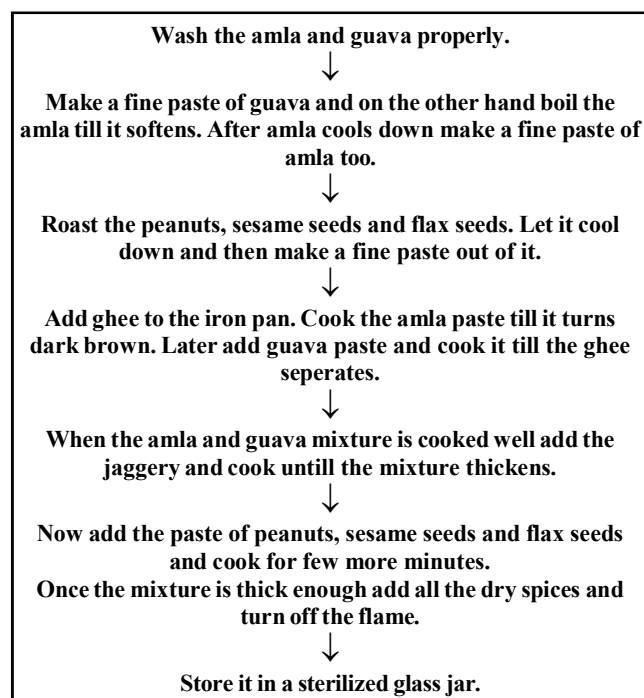
The development and standardization of chyawanprash was carried out in the Department of Home Science, Deen Dayal Upadhyaya Gorakhpur University.

## Selection of Ingredients:

The following ingredients contain a lot of nutrients and antioxidants. Hence they were selected for preparation of chyawanprash.

1. Amla	2. Guava	3. Jaggery	4. Cinnamon
5. Dryginger	6. turmeric	7. Basilseeds	8. Blackpepper
9. Shatavari	10. Peanuts	11. Sesameseeds	12. Flaxseeds

## Method of preparation:



## Standardization of Recipe:

3 samples of chyawanprash having varying amount of ingredients were standardized and samples were coded as C1, C2, C3 (Table 1).

**Table 1 : Showing standardization of 3 recipes in different ratios**

Sr. No.	Ingredients	C1(50:50)	C2(70:30)	C3(30:70)
1.	Amla	250g	280g	120g
2.	Guava	250g	120g	280g
3.	Jaggery	150g	150g	150g
4.	Dryginger	10g	5g	10g
5.	Cinnamon	1inch	2inch	3inch
6.	Turmeric	5g	3g	5g
7.	Basilseeds	10g	5g	10g
8.	Blackpepper	5g	5g	5g
9.	Shatavari	5g	5g	5g
10.	Peanuts	10g	10g	5g
11.	Sesame seeds	10g	10g	5g
12.	Flaxseeds	10g	10g	5g

The 3 samples C1, C2, C3 were subjected to sensory evaluation by the trained panel members to assess the appearance, colour, flavour, texture and overall acceptability of chyawanprash using 9 point hedonic scale.

## RESULTS AND DISCUSSION

The sensory evaluation of chyawanprash was done by a team of 5 panel members and data was expressed in terms of score on a 9 point hedonic scale and is presented in table 2. Among all the samples (C1) recorded highest score for all the characteristics. Each member of the panel rated the chyawanprash out of 9.

According to the sensory evaluation C1 (50:50) is the most acceptable sample among all. It is selected for further lab test (Table 2).

**Table 2 : Showing sensory evaluation score of all 3 variations**

Sample	Flavour and taste	Colour and appearance	Smell	Overall Acceptability score
C1	43	42	48	80
C2	38	34	36	67
C3	39	37	34	54

Being the most highly scored sample, the nutritive value of this sample was calculated (Table 3).

**Table 3 : Showing the nutritive value of sample C1**

Nutritional Information	
Nutrient Values	Per100g
Energy	237.9kcal
Protein	2.06g
Carbohydrate	54.2g
Fat	0.47g

The nutrient composition was calculated using nutritive values of Indian foods (Gopalan *et al.*, 2004).

Recommendation: 2 Spoons /day

### Assessment of Antioxidants:

The selected sample C1 was sent to RFRAC for lab test.

The 2 main parameters tested in lab were vitamin c and total antioxidant mg GAE/100g.

The test report revealed very surprising result as the amount of vitamin c in the sample was very high. The result showed 124.15mg/100g. The testing method applied was IS:5838:1970 RA 2020. This Indian Standard

was adopted by the Indian Standards Institution on 30 November 1970.

This standard covers two methods, namely, 2,6-dichlorophenol indophenol method and 2,4-dinitrophenylhydrazine method, commonly used for estimation of vitamin C in foodstuffs. The 2,4-dinitrophenylhydrazine method is particularly suitable when the sample contains a very low amount of ascorbic acid.

According to the report the total antioxidant mg GAE/100g content in the sample is 1381.06. The testing method applied was AOAC SMPR 2011.011

According to journal of AOAC International this method is In vitro methods for determination of total (hydrophilic and lipophilic) antioxidant activity in foods, beverages, food ingredients, and dietary supplements.

As sample is showing higher antioxidant activity, this developed chyawanprash is full of health benefits for not only in PCOS as well as other degenerative diseases.

### Conclusion:

Natural health products with medicinal benefits are gaining more popularity in today generation as they offer better alternatives as compared to synthetic medicines. They do not cause any side effects as compared to synthetic medicines. Chyawanprash is an ayurvedic health supplement which is a mixture of various herbs each having specific benefits. The chyawanprash developed in this research is very helpful in managing the major symptoms of PCOS, as the ingredients used in this recipe are rich in antioxidants and nutrients. This product is very easy to consume. Women suffering from PCOS have to consume 2 tbsp of this chyawanprash per day. Following a healthy lifestyle along with supplementation of this chyawanprash can give very good results.

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