

Formulation and Evaluation of Herbal Dry Powder For PCOS

Bargal S.A, Pawar Bharti M, Tupe Punam P.
Rashtriya College of Pharmacy, Hatnoor

Abstract: PCOD is a condition and PCOS (Polycystic ovary syndrome) is a symptoms. PCOD or PCOS is a reproductive and metabolic disorder concerned with the ovaries. PCOD or PCOS is a condition in which ovary of women of childbearing age is enlarged and start producing an excessive amount of male hormones (androgens) and is the main cause of infertility, diabetes, irregular menstrual periods and hirsutism. The PCOS can be largely increased in our world due to lack of awareness among young women's and ignorance. Between 5% and 10% of women of childbearing age (between 15 and 44) have PCOS. Phytosomes for the treatment of polycystic ovary syndrome PCOS are the primary focus of this study. This study found that certain plant components contain polyphenolic substances, including isoflavones and flavonoids that can improve reproductive health in women. A thorough review of the literature was carried out to identify the most relevant information. Articles were selected from Google scholar and Google.

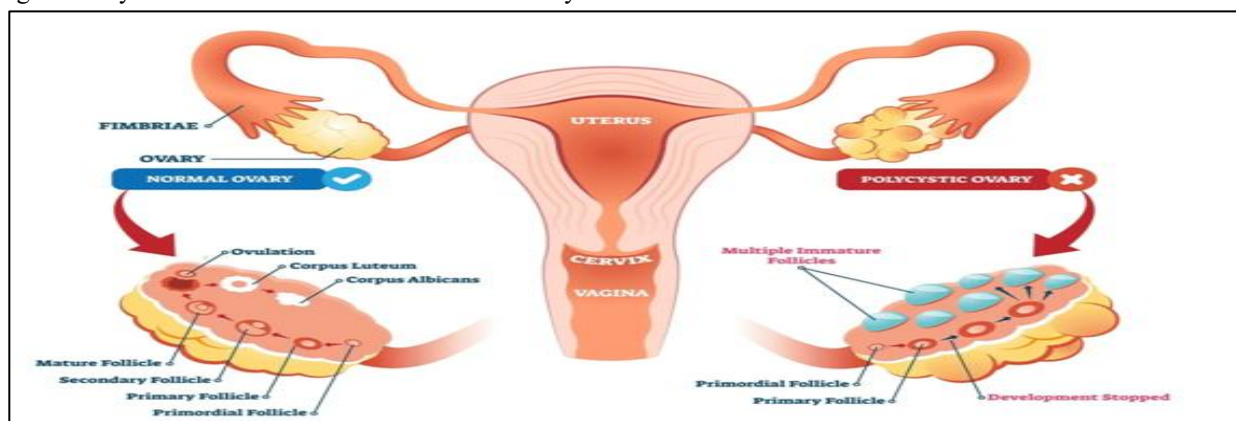
Key word: Polycystic ovary syndrome, etiology, causes, risk factor, diagnosis, treatment.

I. INTRODUCTION

PCOS, also known as PCOD, is a condition where a woman's hormones are not balanced. If left untreated, it can eventually result in major health issues like diabetes and heart disease. Ignorance and a lack of awareness among young women can contribute significantly to the rise in PCOS in our society.

Infertility may result from PCOS that is not identified .Approximately 5-10% of women between the age of 15 and 44 who are of reproductive age suffer from PCOS.^[1] PCOS, which is characterized by the presence of numerous cysts on the ovaries , is a condition that induce disruption in the normal menstrual cycle and can result in a variety of symptoms include excessive menstrual bleeding ,irregular periods, and anovulation, which is the absence of ovulation. A poor diet, a lack physical activity, and obesity are all lifestyle variable that contribute to the worsening of insulin resistance and kormonal abnormalities. Woman who have PCOD frequently have increased levels of inflammatory markers, which can further contribute to insulin resistance and ovarian dysfunction. Inflammation is also found to be involved in this condition. ^[2]

The World Health Organization (WHO) stated that PCOS affected over 116 million women worldwide in 2012. One in five Indian women are affected by PCOS. ^[3] Normal ovulating ovaries contain fluid-filled sacs called follicles, with variations in size from 1 to 30 millimeters, which depends upon the phase of the menstrual cycle. The individual sacs or follicle contain a tiny egg, which never mature enough to trigger ovulation. While in the polycystic ovary, there are more than 12 small follicles, measuring 2 to 9 millimeters in diameter, and are usually arranged in a 'pearl-necklace' manner around the periphery.^[4]

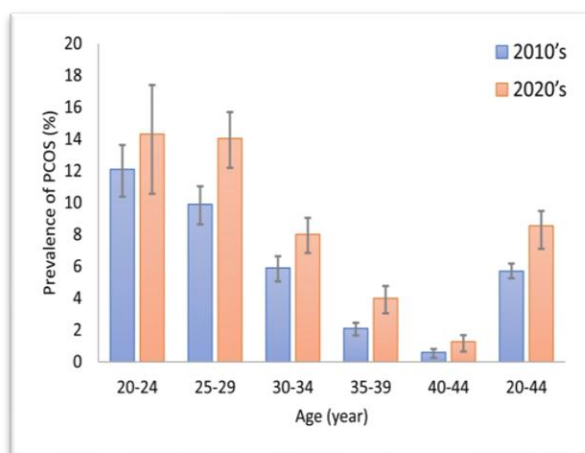


1.Fig: Difference between normal and polycystic ovary

II.EPIDEMIOLOGY OF PCOS IN INDIA

Only a few researchers have studied the prevalence of PCOS in India and among those, most of the sampling was convenience based, which might not reflect the true status of PCOS prevalence in the community. A pilot cross- sectional study conducted in Tamil Nadu assessed young adolescent females and found a prevalence of 18% for PCOS.^[5] They also concluded that the proportion of PCOS was higher in urban women in comparison to the rural women. A similar study conducted in Mumbai, which was an urban community- based study, found that the prevalence of PCOS was 22.5% by the Rotterdam criteria and 10.7% by the Androgen Excess Society criteria.^[6]

A study conducted among medical student at a private medical college in South India using the modified Cronin questionnaire, which include 10 items, found that PCOS was a common disorder among the participates and reported a high incidence of mood disorder among them. ^[7] A study from Lucknow was published, in which college going women with menstrual irregularity and hirsutism, in the age range of 18-25 yr, were studied, and it was reported that the calculated prevalence using the NIH criteria, among the participants, was only 3.7%.^[8] Another study from Andhra Pradesh studied young women from a residential college and found that 9.13% of them satisfied the Rotterdam criteria for PCOS.^[9] Hence, from the limited data available, it can be said that the prevalence of PCOS in India ranges from 3.7 to 22.5%.



2. Fig: Prevalence of PCOS (%) vs Age (year)

III.CAUSES OF PCOD

There are various external, environmental and internal factors that causes the PCOS.

- External factors: Genetic mechanism: The gene types implicated in the development of PCOS are classified as follows: genes involved in the steroidogenesis of the ovary and adrenal glands, genes involved in the actions and regulation of steroid hormones, genes involved in the action and secretion of insulin, genes affecting energy homeostasis, and genes implicated in chronic inflammation. ^[10] Thus some particular alteration in some genomes is the reason for development of PCOS. Some examples of genes involved in development of PCOS are Calpain 10 (CAPN10), Cytochrome p450, Insulin gene, Androgen Receptor (AR), Fat Mass Obesity (FMO), and Follicular stimulating hormone receptor (FSHR). ^[11]
- Environmental factors: Exposure to Endocrine Disrupting Chemicals (EDC) may also play a role in development of PCOS. The Endocrine Society defines Endocrine Disrupting Chemicals as “an exogenous chemical, or mixture of chemicals, that interfere with hormonal action.” These chemical substances can affect the endocrine system and results in adverse effects.^[12] Bisphenol A (BPA), perchlorate, dioxins, phthalates, phytoestrogens, polychlorinated biphenyls (PCB), polybrominated diphenyl ethers (PBDE), triclosan, perfluoroalkyl and polyfluoroalkyl substances (PFAS), pesticides such as dichlorodiphenyltrichloroethylene (DDT) and its metabolite dichlorodiphenyldichloroethylene (DDE), organophosphorus compounds, alkyl phenols (surfactants), parabens, methoxychlor, diethylstilbestrol (DES) fungicide vinclozolin, and natural hormones are the commonly used EDC.^[12,13] EDCs work as agonists or antagonists by binding to hormone receptors and leading to increase, decrease, or prevent the activity of the hormones.^[14] Women who are exposed to air pollutants, such as particulate matter (PM) 2.5, sulphur dioxide, nitrogen oxides, and polycyclic aromatic hydrocarbons (PAHs), may have an increase in inflammatory mediators, which alters

normal steroidogenesis and causes PCOS to develop.^[15]

- Diet: Diet rich in fat, mainly saturated fatty acids and intake of foods with the high glycemic index increases the risk of insulin resistance and its related complications including obesity and PCOS.^[16]

- Internal factors:

Insulin resistance: PCOS is frequently characterized by insulin resistance and compensatory hyperinsulinemia. Some studies indicate that hyperinsulinemia contribute to the hyperandrogenism of the condition by raising ovarian androgen production and impairing ovulation. This is the effect of insulin inducing ovarian cell, called as theca cell, that are responsible for androgen biosynthesis to produce testosterone.^[17]

Hyperandrogenism: It results from overproduction of androgen produce due to abnormal ovarian function and insulin resistance. Hyperandrogenism hinders the growth of follicles, which are the sac in the ovaries where eggs get develop, and inhibits normal ovulation.^[18]

Inflammation: The imbalance between pro-inflammatory and anti-inflammatory cytokines, as well as cytokine gene polymorphism, may influence etiology of PCOS. Thus, inflammatory reaction serves as mediator in the development and aggravation of the metabolic features of PCOS. Adipocytes have the ability to increase the production of pro-inflammatory chemicals, which can result in chronic inflammation.^[19] Inflammation directly stimulates overproduction of androgens in the ovaries. The degree of hyperandrogenism may have an effect on the development of abdominal adiposity, which contributes to the inflammatory load in PCOS.^[20] Research has linked elevated levels of androgen to inflammation.^[21]

Obesity: Obesity activates the theca cells that stimulate luteinizing hormone which lead to ovarian androgen excess. High androgen levels lead to improper periods and obesity.^[22]

IV.SYMPTOMS OF PCOS

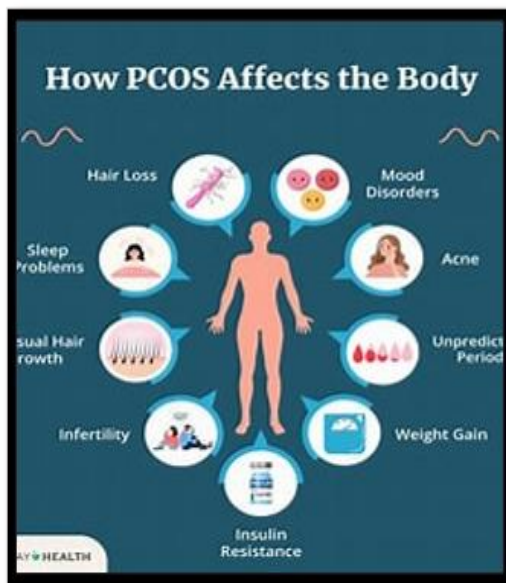
Most of ladies are not even aware that they have PCOD. For an early identification of the issue, it is critical to pay attention to these signs.^[23] PCOS symptoms might appear in early adulthood, although they can also start soon after puberty. Anovulation causes irregular or absent menstruation in many PCOS-affected women; however, some may develop ovarian cysts.^[24]

It has many signs and symptoms:

- Irregular periods: This is most typical PCOD symptom. PCOD first manifests as irregular or frightening periods. Observe your monthly cycle closely in order to identify PCOD.^[23,24]
- Excessive facial and body hair (Hirsutism): Excessive facial hair growth is known as Hirsutism. Women with PCOD have excessive hair growth because their ovaries secrete a large amount of the masculine hormone androgen.^[23,24] Up to 70% of women with PCOS experience Hirsutism, a frequent clinical manifestation of hyperandrogenism. The face, arms, back, chest, thumbs, toes and abdomen are among the areas that may be impacted by excessive hair growth, which is link to PCOS because of hormonal fluctuations.^[23]
- Acne and Oily skin: Acne and other facial issues are caused by hormone disruption in PCOD. Acne is result of an overabundance of male hormone. PCOD causes severe cystic acne in certain women.^[24] The inflammatory condition known as acne that affects the hair follicle and the sebaceous and apocrine glands that are connected to it. The main issue for female acne suffers is elevated sebum production while serum androgen levels are frequently not elevated.^[25]
- Mood swings: Hormonal imbalance and irregular periods are brought on by PCOD. Abrupt mood swings are cause by this hormone imbalance. Depression and anxiety are common symptoms.^[26]
- Weight gain: High amounts of male hormones and insulin in women are produced by the body in PCOS such women experience this weight gain suddenly. An abundance of fat in the lower abdomen is a typical sign of PCOD.^[23] The

frequency of overweight and obese women in PCOS communities varies greatly between nation. In Italy, 10% of women with PCOS are overweight but not obese, while in Kuwait, the percentage is 37%. According to research done in the US and Australia, the highest rates of obesity are found among women with PCOS, of whom 61% to 76% are obese.^[24]

- Heavy bleeding: The uterine wall has increased accumulation since the periods are irregular. This causes more bleeding each time a period occurs.^[21,23]
- Hair Thinning: Hair loss is a common symptom of PCOD in females. For some women, hair loss is completely total. Hormone imbalance within the body is the cause of this. Hair loss or scalp thinning is brought on by an excess of androgen.^[23]



3. Fig: Symptoms of PCOS

- Diabetes: Insulin levels are higher in women with PCOS, which raises their risk of diabetes.^[23] Insulin resistance is one of PCOS primary traits. Significant evidence has been found through epidemiology studies connecting PCOS to an increased risk of type 2 diabetes, impaired glucose tolerance (IGT), and gestational diabetes mellitus (GDM). PCOS and GDM are related to each other. A recent meta-analysis indicates that women with PCOS are generally three time more

likely to have the condition, despite the fact that there hasn't been much research on prevalence to date.^[24]

- Pelvic pain: Along with severe bleeding and headaches, pelvic discomfort can also happen during menstruation.^[23]
- Sleep problem: Sleep issues including sleeplessness are common complaints from women with PCOS. A sleep apnea disorder known as PCOS has been associated with it.^[21,23] Breathing pauses during the night is a common symptom of sleep apnea, which interferes with sleep.^[21]
- Skin Darkening: Dark patches may appear on the skin of the body, including the neck, groin, beneath the breasts.^[21]

V. PATHOPHYSIOLOGY OF PCOS

The fundamental pathophysiological defect concerning PCOS is not known, but some of important features include resistance to insulin, excess production of androgen, and transformed gonadotropin dynamics.^[27] Organs that are affected by PCOS are a woman's ovaries, it is the reproductive organ through which estrogen and progesterone hormone are produced and ultimately menstrual cycle is regulated. It is myth that women do not need for male hormones but fact is ovaries produce a negotiable amount of male hormone that we called as androgen. In PCOD, there are elevated levels of luteinizing hormone, which is three time higher than Follicle stimulating Hormone, which ultimately levels to increased production testosterone by the ovaries leading to the growth of facial hair and acne.^[28]

It is also associated with an imbalance in glucose and insulin dysfunction, which leads to the obesity, diabetes, a rise in cholesterol level, and an increase in blood pressure. Thus increased the production of androgen block the ovulation process and causes follicular atresia (Growth of follicle is arrested), before the pre-ovulatory phase. Also, if women take a diet, which is high in carbohydrate and fat content then weight gain resulting from dietary plan seems to exacerbate the sign of PCOD. Women having PCOD are at high risk of developing diabetes, cardiovascular diseases, infertility and endometrial cancer.^[29,30]

VI. DIAGNOSIS OF PCOD

Since PCOS is a syndrome and cannot be diagnosed by single diagnostic criteria, it is identified by any two out of the following three clinical criteria, because women having PCOD may have:

- Oligomenorrhoea (irregular or prolonged menstrual cycles)
- Hyperandrogenism (excessive production of androgens)
- The polycystic appearance of the ovaries (multiple follicles in the ovary)

A doctor must be able to see the ovaries while investigating for polycystic ovaries and this can be done by using abdominal ultrasound, vaginal ultrasound and laparoscopy. In abdominal ultrasound, a map of the area being scanned by using soundwaves and investigate the ovaries. Though this method is painless ovaries are not visible so vaginal ultrasound or laparoscopy is done to have a clear look at the ovaries. Vaginal ultrasound is not done in unmarried women, because it can be done using a vaginal probe, which is gently inserted into the vagina and placed right next to the wall of ovary to get a clear look at the prominence of cysts. While laparoscopy, a cut in the naval is made and an extremely small telescope is allowed to enter through the cut and allow the surgeon to have a clear and complete look at ovaries, uterus, and fallopian tubes, and so on. With the help of laparoscopy, the doctor can get a good quality picture of the desired part.^[31]

Oligomenorrhoea is a condition when there is a skip of more than 3 menstrual cycles or we can say that irregular menstrual cycle. There are several blood tests, which are done to check the menstrual irregularities and these are level of Luteinizing Hormone (LH), Follicle Stimulating Hormone (FSH), TSH, and 25 Prolactin, which is known as PCOD panel as all these laboratory tests are done under PCOD panel. Hyperandrogenism is when there is excess production of androgen, which is exposed by acne, oily skin, and excess hair on the face, chest, and stomach.^[32,33,34]

Ayurvedic herbaSl remedies for PCOS:

Ayurvedic medicine uses a multifaceted strategy to: Correct the hormonal balance, treat obesity and avoid

high cholesterol levels, Treat insulin resistance. In order for the menstrual cycle to occur in a “normal” way, the goal of herbal treatment is to allow the body to read just the excess hormone levels to more “normal” levels. Alkaloids, cardiac glycosides, anthraquinones flavonoids, mucilage, and enzymes are all found in herbs and have a variety of pharmacological effects. PCOS can be treated with these herbs alone or in combination. This article discusses a few of the botanicals and commercial preparations.^[35]

AIM: The main goal of polycystic ovarian syndrome disease (PCOS) for reduce symptoms and maintain regular menstrual cycle.

Objective:

Maintaine regular menstrual cycle

- 1) Reduce the obesity
- 2) Correct hormonal imbalance
- 3) Improve insulin sensitivity
- 4) Reduce risk of cardiovascular disease

INGREDIENTS OF HERBAL DRY POWDER.

Ingredients	Quantity	Uses
a) kachnar powder	10 gm	bacterial agent
b) amla powder	5gm	anti - inflammatory
c) black pepar powder	2.0 gm	anti microbial
d) ginger powder	2.0 gm	carminative agent
e) cinnamon	1.0gm	antioxidant

VII. MATERIALS AND METHODS

1. Kachanar

Synonym: Bauhinia purpurea, Rakta Kanchan

Biological source: Dried bark and leaves of Bauhinia purpurea

Family: Fabaceae

Chemical constituents: Hentriacontane, Octacosanol, Sitosterol, Lupeol, Tannins, Lignins



3.Fig:Kachanar

Uses:

- Anti-inflammatory & Antibacterial
- Anticancer
- Reduces inflammation
- Helpful in menstrual irregularities

2. Amla

Synonym: Indian Gooseberry, Malacca tree

Biological source: Fresh and dried fruit of *Emblica officinalis*

Family: Phyllanthaceae

Chemical constituents: Vitamin C, tannins, polyphenols, minerals, amino acids



4.Fig: Amla Powder

Uses:

- Boosts immunity
- Used in Chyawanprash
- Used in hair oils and dyes
- Liver tonic and diuretic
- Anti-inflammatory and antidiabetic agent

3. Cinnamon

Synonym: Cinnamon Bark, Dalchini

Biological Source: Dried inner bark of the shoots of *Cinnamomum cassia*

Family: Lauraceae

Chemical Constituents: Essential oils, Cinnamaldehyde, Eugenol, Cinnamic acid, Coumarin



5.Fig: Cinnamon Powder

Uses:

- Used as a flavouring agent in sweet dishes and curries
- Acts as an antioxidant
- Acts as an anti-inflammatory agent
- Used in candies, chewing gum, and toothpaste

4. Black Pepper

Synonym: *Piper nigrum*, Kalimirc

Biological Source: Dried unripe berries of *Piper nigrum*

Family: Piperaceae

Chemical Constituents: Piperine, essential oils, volatile oils



6.Fig:Black Pepper

Uses:

- Used as a stimulant, stomachic, and carminative medicine
- Used in dietary supplements to improve absorption
- Acts as an antioxidant, anti-inflammatory, and antimicrobial agent

5. Ginger Powder (Sunthi)

Synonym: *Zingiber*, Adarak

Biological Source: Scraped or unscraped rhizomes of *Zingiber officinale*

Family: Myrtaceae (the slide shows this, though ginger is commonly classified under Zingiberaceae)

Chemical Constituents: Volatile oils, Zingiberene, Gingerols



7.Fig:Ginger Powder

Uses

- Used as a carminative agent
- Used as a flavouring agent
- Helps relieve nausea and aids digestion

Methods of preparation

- 1) Drying:- All the powder of dry from grinded Size reduction: - the crude ingredients was collected and these ingredients were size reduce using driven mixer individually.
- 2) Weighing:- next work weight out the ingredients from the batch for some ingredient, only a small Amount of is necessary in the batch but if a very large batch is being made. And several ingredients Are needed in large amount
- 3) Mixing; - in a formula in which no pre mixing is required, after checking and weighing the ingredients are simply mix mixture the ingredients are completely mixed with each other.
- 4) Filling; - the finished batch of powder formed place in the filling area. then the measured Amount of powder on the whighing balance.

VIII.EVALUATION TEST OF POWDER

• ORGANOLAPTIC TEST

Color: Greenish /Light Green

Odour: Pungent

Taste: bitter /spicy

• PHYSICAL PARAMETER

1) Angle of repose:-

The angle of repose is the maximum angle between the surface of a pile of granular material and the horizontal plane at which the material will remain in place without sliding. Beyond this angle. The material will start to slide or flow. Where:

- Θ = angle of repose
 - H = height of the pile
 - R = radius of the base of the pile
- $$\Theta = \tan^{-1} h/r$$
- $$= 27.15$$

2) Tapped density

The tap density of powder was determine using the tapped density apparatus after subjecting it to 50 tap. The apparatus measure the tapped value of powder from which tapped density is calculated ha a weight taken divided by tap value.

$$\text{Tap density} = 20/50$$

$$= 0.4 \text{ gram}$$

3) Bulk density:

To determine the bulk density of powder 10 gram of powder sample where place into a granulated measuring cylinder and tapped on a wooden surface. the bulk density was calculated using the tapped density volumetric flask into which the 10-gram powder sample was transfer the bukl density was determine using the following formula.

$$\text{Bulk density} = \text{wight taken bulk volume}$$

$$= 20/60$$

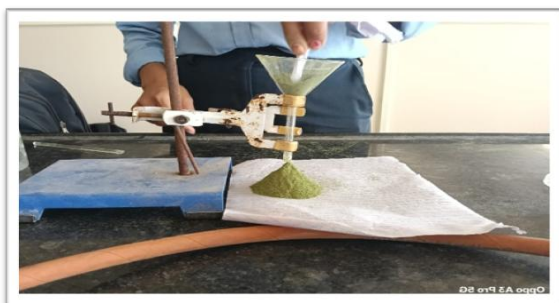
$$= 0.33 \text{ gram}$$

TABLE:

HERBAL DRY POWDER 20 GRAM	
Ingredients: -	Mfg Lic No :503505
1. Kachanar Powder: 10gm	Batch no: C
2. Amla Powder: 5gm	Mfg Date: 26/ 05/ 2026
3. Cinnamon Powder: 2.0gm	Exp Date: 24 / 05 / 2028
	MRP: 50 RS/-

4. Black Pepper Powder: 1.0 gm	Storage: Store in dry and cool place in the air tight container.
5. Ginger Powder: 2.0 gm	Direction For Use: take 1 tablespoon in the 1 glass of milk or water
Mfg By: Rashtriya College of Pharmacy, Hatnoor.	

1. Angle Of Repose



2. Tap Density:

Before



After



IX.RESULT

The dry powder contain crude drug such as kachnar were manufactured.



X.CONCLUSION

PCOD, or PCOS, is a reproductive illness in which a woman's ovary enlarges and begins to produce excessive amounts of male hormone (Androgen), and it is the main cause of infertility, diabetes, every month abnormalities, and hirsutism. The pathophysiologic abnormality is undefined but a number of important characteristics are known, including insulin resistance and an increase in androgen production. The disease's diagnostic criteria involve having two or more of the following symptoms: Hyperandrogenism, oligomenorrhea, or polycystic ovaries. Herbal remedies can be used to treat PCOD.

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