USE OF RICE WATER (Oryza sativa) & HIBISCUS (Hibiscus rosa-sinensis) FOR HAIR NUTRITION AND HAIR GROWTH

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Abstract:

Healthy looking hair is a sign of good health, beauty and hair care practices which moulds one's personality. Human hair follicle cycle consist of 4 main phases anagen, catagen, telogen and exogen. Hair get its pigment from Melanin stored in hair follicle cells. Follicle can lose their ability to produce melanin as age which result in growth of grey or white hair damage follicle can also stop producing hair which can lead to certain condition such as alopecia which can cause follicle to stop producing hair altogether. The main objective of this study is to comprehend the hair nutrition and hair growth activity of rice water and hibiscus.

When rice water is created the water becomes loaded in vitamins, amino acids and other trace minerals (Zn, Mg, Vit. B and C etc.) which helps to strengthen and improve the condition of the hair cuticle, nourish the hair follicles and repair damaged cells whereas hibiscus helps to control hair fall due to calcium, riboflavin, phosphorus and vitamin C. Use of hibiscus can help strengthen and improve the condition of hair cuticle and boost shine.

Keyword: Human hair, growth cycle, hair nutrition, hair strength, rice water, hibiscus.

I. INTRODUCTION

1.1 HUMAN HAIR

Human hair has about 65-95% of its weight in proteins, more 32% of water, lipid pigments and other components. Chemically, about 80% of human hair is formed by a protein known as keratin, with a high grade of sulfur. Keratin is a laminated complex formed by different structures, which gives the hair strength, flexibility, durability, and functionality (1) . The physicochemical properties and shape of the hair is the direct result of the organization of its various structural elements, proteins being the most significant. Hair shape is defined in the hair follicle: large hair follicles produce "terminal" hairs (scalp), small follicles produce fine "vellus" hairs (body hair), curved follicles produce curly hair in all ethnicities (2).

1.1.1 STRUCTURE OF HAIR:

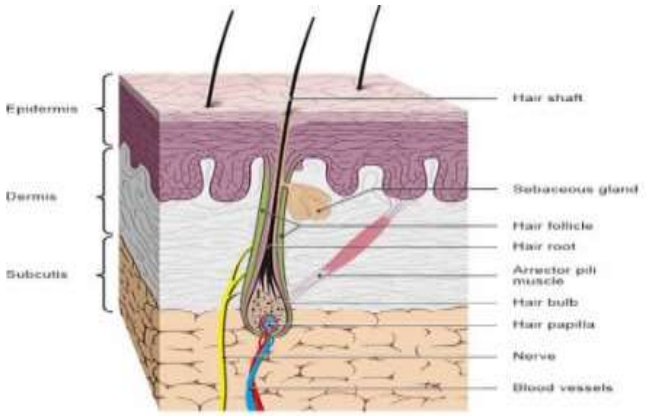
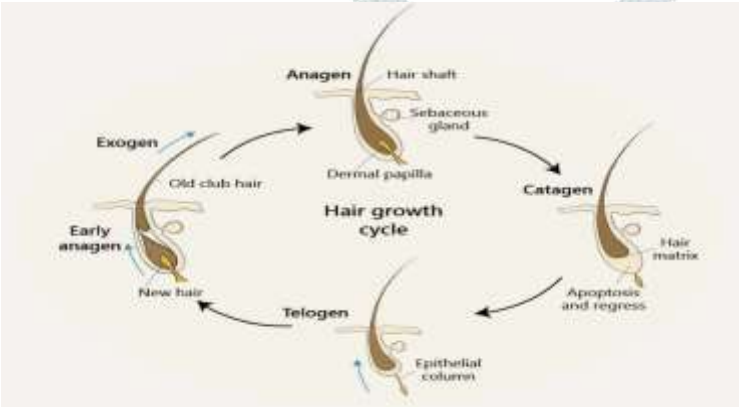


Figure 1: structure of hair

- Each hair has a hair shaft and a hair root. The shaft is the visible part of hair that sticks out of the skin. The hair roots is in the skin and extends down to the deeper layers of skin. It is surrounded by the hair follicle (a sheath of skin and connective tissue), which is also connected to a sebaceous gland.
- Each hair follicle is attached to a tiny muscle (arrector pili) that can make the hair stand up. Many nerves sense hair movement and are sensitive to even the slightest draft.
- At the base of the hair, the hair root widens to a round hair bulb. The hair papilla, which supplies the hair root with blood, is found inside the bottom of the hair bulb. New hair cells are constantly being in the hair bulb, close to the papilla.
- New cells are constantly forming in the hair bulb. These cells stick together and harden. The full strand of hair develops from this group of hardened hair cells. Because new hardened cells keep on attaching to the hair from below, it is gradually pushed up out of the skin. In this way, a single hair on your head grows at a rate of about 1 cm per month.
- The color of the hair is determined by the amount of melanin in the hardened cells. This can vary a lot from person to person, and it changes over the course of a lifetime. The amount of melanin typically decreases as people get older, and more air gets trapped inside the hair – it then loses its color and turns white. Depending on someone's original hair color and the number of white hairs that grow, the hair on their head then turns gray or white. (3)

1.1.2 HAIR GROWTH CYCLE:



(4) Fig 2: stages of growth cycle

Stage	Key feature
Anagen	Active growth phase Early anagen: hair matrix forms new hair Nourishment of HF from blood supply enables hair growth Lasts 2–6 years.
Catagen	Intermediate or "transition" phase Deeper portion of the HF starts to collapse, HF detaches from nourishing blood supply Lasts 1–2 weeks
Telogen	Resting phase Remains of the hair bulk are inactive, papillary cells completely separate from HF Lasts 5–6 weeks
Exogen	Shedding phase Hairs at the end of their life fall out Mainly coupled to early anagen but also occurs in telogen

Table 1: The main phases of hair growth (5)

- **Hair Follicle Cycling**:

The HF of mammalian skin regularly cycles between involution and regeneration throughout postnatal life. (6)

There are four main phases of the HF cycle: 1.anagen (growth), 2.catagen (regression), 3. telogen (rest), & 4.exogen (shedding). (5) (Figure: 2 ; table:1)

The duration of each phase varies by anatomical location, nutritional and hormonal status, age, and species (7). In mice, for example, the first "test" hair shaft is generated relatively late at 17 days postpartum (8) and is consequently often misinterpreted as "first anagen". Scalp follicles undergo 10–30 cycles in a lifetime. The cycling of human HF is thought to be associated with the distribution of white adipose tissue which clusters around pi-losebaceous units in structures called "dermal cones" (9)

1. ANAGEN(growth):
   Anagen is the growth phase, and true anagen occurs 4 weeks after birth (10) . The stem cells present within the bulge region begin to proliferate at the onset of anagen to produce a new lower HF. Human HF bulge cells are keratin 15 (K15) positive and express high levels of β1- integrin (11). The hair matrix transient amplifying cells, derived from epithelial HF stem cells in the bulge, also proliferate intensively and subsequently differentiate into distinct epithelial hair lineages (12). For the remainder of anagen, and for catagen and telogen growth phases, the HF stem cells are otherwise extremely slow-cycling (11). The anagen growth phase of human scalp hairs can last between 2 and 8 years. (13)
2. CATAGEN (regression):
   Catagen marks the period of rapid HF involution, where the entire lower two thirds of the HF rapidly degenerate over 2–3 weeks leaving only club hair surrounded by an epithelial cap (fig:2). This occurs mainly by apoptosis of dermal matrix, inner root sheath (IRS), and outer root sheath (ORS) keratinocytes. There is sparing of the bulge HF stem cells (14). The end result is formation of an epithelial strand, a remnant of the HF, which functions to approximate the dermal papilla with the bulge (15). In mice, the old hair shaft (club hair, now detached), normally remains in situ in the hair canal as the new hair emerges through the same orifice. In mice, the club hair may rest in the socket for several cycles and thus act to contribute to the density of the coat and leads to bulging of the ORS around the club (16).
3. TELOGEN(rest):
   Telogen follows catagen, marks the resting phase of HF cycling & involves the shedding or loss of hair (17) (Fig: 2).Early in life, mice have highly coordinated HF cycling throughout the skin, but synchrony is lost with increasing age (18). Humans (19), on the other hand, exhibit desynchronization of HF cycles shortly after birth (18). Furthermore, the duration of telogen increases throughout development; there is slower HF turnover in aged animals (19) and in humans Although classically thought of as a stage of relative quiescence, telogen is now recognized to be an extremely active stage that is critical in controlling HF cycling (18). The variety in hair length observed throughout the human body (e.g., eyelashes, torso, scalp) is due to the ratio between anagen and telogen phases. Scalp hair, for example, has a high anagen: telogen ratio resulting in long hair,

but eyelashes and hair on the limbs spend less time in anagen and more time in telogen, resulting in shorter hair (21)

4. EXOGEN(shedding):
   While old hair shafts can be shed passively by mechanical forces, shedding in exogen is primarily an active process (22). Human HFs transition through the cycles at different rates. On average human HFs cycle every 2–8 years, meaning at any one point roughly 86% of hairs are in anagen, 1% are in catagen, and the remaining 13% are in telogen (23).

1.1.3 NUTRIENTS IMPORTENT FOR HAIR HEALTH:

Beta carotene	Biotin	Vitamin B1	Vitamin B2
VitaminB5(pantothenic acid)	Vitamin B6	Vitamin B12	Vitamin D
Vitamin E	inositol	Folic acid	Calcium
Zinc	Iron	L-Methionine	L – Cysteine
L Lysine	L-Taurine	Selenium	Polyunsaturated fatty acids (PUFAs)

Table 2: nutrients important for hair health (24)

1.1.4 FOOD THAT ARE IMPORTANT FOR MAINTAING GOOD HAIR HEALTH:

- SALMON: provide omega-3 fatty acids, protein, vitamin B-12 and iron. Supports scalp health.
- DARK GREEN VEGETABLES: Spinach, broccoli and Swiss chard, provide vitamins A & C used in sebum production (secreted by hair follicles). Dark green vegetables provide iron and calcium.
- BEANS: provide protein, iron, zinc, and biotin. Biotin deficiencies can result in brittle hair.
- NUTS: Brazil nuts are a natural source of selenium. Walnuts contain zinc and alpha-linoleic acid, an omega-3 fatty acid that may help hair condition. Pecans, cashews and almonds also contain zinc. Zinc deficiency can lead to hair shedding.
- POULTRY: provides the high-quality protein and iron. Deficiency of protein leads to weak and brittle hair.
- EGGS: Eggs are sources of protein, biotin and vitamin B-12 – important beauty nutrients.
- WHOLE GRAINS: Provides zinc, iron & vitamin B.
- OYSTERS: Provide zinc, a powerful antioxidant.
- LOW FAT DAIRY PRODUCTS: Calcium, Whey and Casein are important minerals for hair growth sourced from skimmed milk and yogurt.
- CARROT: excellent source of vitamin A.

  Balanced diet of lean proteins, fruits, and vegetables, whole grains, legumes, and fatty fish (salmon) and low- fat dairy products are potential aides to hair. (24)

II. BRIEF INFORMATION ABOUT RICE WATER AND HIBISCUS

2.1 RICE WATER

Figure 3: Rice water

2.1.1 DESCRIPTION:

Rice water is the starchy water left over after rice is cooked or left to soak. It is thought to make the hair smooth and shiny, as well as help it grow faster. Rice grains contain 75–80% starch. Rice water is thought to contain many of the vitamins and minerals contained in rice. (25)

2.1.2 PLANT:

- Botnical name: Oryza sativa
- Biological source: consists of embryo and endosperm of the seeds of Oryza sativa.
- Family: Graminae/ Poaceae (26)

2.1.3 SCIENTIFIC CLASSIFICATION:

- Kingdom: Plantae – plantes, Planta, Vegetal, plants
- Subkingdom: Viridiplantae – green plants
- Superdivision: Embryophyta
- Division: Tracheophyta – vascular plants, tracheophytes
- Subdivision: Spermatophytina – spermatophytes, seed plants, phanérogames
- Class: Magnoliopsida
- Family: Poaceae/Graminae – grasses, graminées
- Genus: Oryza L. rice
- Species: Oryza sativa L. – rice (27)

2.1.4 CHEMICAL CONSTITUENTS:

The rice grain constitutes 12% water, 75–80% starch(carbohydrate), 7% protein, 3% fat and 3% fibres. (26)

2.1.5 PHARMACOLOGICAL PROPERTIES:

- Antioxidant, anti-colitis, anticancer, antitumor, anti-mutagenic, antidiabetic, ocular impairment, anti-aging, and anti-inflammatory.
- Rice water also has vitamin B, C, E and minerals which promotes skin cell growth & stimulates blood flow. (28)

2.1.6 DOES RICE WATER MAKE YOUR HAIR GROW?

Before we dive into if rice water really does work for hair growth, let's have a little history lesson. According to a study from the **International Journal of Cosmetic Science** the use of rice water for healthy, long hair dates back to the Heian Period in Japanese history, where court ladies were said to have combed their hair each day using Yu-Su-Ru (the water obtained from the rinsing of rice), resulting in beautiful, long hair that reached the floor (29)

Also in the Chinese village of Huangluo, home to native Red Yao women, is in the Guinness Book of Records as the 'world's longest hair village'. The women here boast long, lustrous and healthy hair that is consistently maintained. So is the secret to their fabulously maintained hair an ancient but extremely simple Chinese remedy is rice water.

Even Korea (which has now seen a revival in traditional beauty techniques) and other South East Asian countries like Thailand, Cambodia and Indonesia have a history of using rice water as a key beauty supplement (30)

Sound too good to be true? Well, not quite. The study found that Yu-Su-Ru did provide positive hair care effects, including reduced surface friction and increased hair elasticity. Rice bran extract, and components of it, including linoleic acid and gamma oryzanol, were examined in a study from the BIOLOGICAL AND PHARMACEUTICAL BULLETIN. The study found that linoleic acid and gamma oryzanol induce the formation of hair follicles and promote hair growth. Backing this up, a study from the **Journal of Nutrition and Food Sciences** notes that **ferulic acid** is present in gamma oryzanol and that ferulic acid stimulates hair growth. (29)

2.1.7 BENEFITS OF RICE WATER:

1.Rice water for hair Strength:

The amino acids in rice strengthen the hair roots. It also has inositol, which is a carbohydrate that helps to strengthen the hair. The rice water makes it easy to detangle hair which leads to less hair breakage.

2. Rice water for hair Shine, smooth and lustre:

Using rice water for hair is an easy way to ensure the hair look shiny and full of lustre. As the rice water adds a layer of protection especially against the pollution in the air, heat-inducing electronic hair appliances, chemicals in hair care products, etc.

These make the hair loose its shine, and the rice water ensures that the hair remains smooth and shiny. Rice water is a natural conditioner that gives the hair a good bounce.

3. Rice water for Hair growth:

Another important reason to use rice water for hair is the fact that it helps hair growth, and you can see the increase in a short span itself. As the rice water helps protect the hair from damage, the hair remains healthy. The protein boost that the rice water gives to the hair helps it grow fast.

4. Rice water for elimination of dandruff and flakes:

Fermented rice water especially that made from red rice inhibits the growth of Malassezia, a fungus that cause dandruff. So using rice water for hair will take care of the dandruff problem. It also gives a moisturising boost to the scalp and the hair, ensuring that the dry skin which in turn causes flakes on skin is taken care of. Using rice water for hair weekly will keep the dandruff and the flakes at bay.

5. It is a chemical free hair cleanser:

using it as a shampoo to wash out your hair may not be as convenient as a store bought shampoo, but it comes without chemicals and preservatives, and you don't even need to follow it up with a conditioner.

6. It balances scalp's pH levels:

Rice water keeps your hair's natural oils intact and its pH levels are similar to that of the scalp! For added benefits, a few drops of your preferred essential oils can be added to rice water, and this mix can replace your regular shampoo.

7. To protect for frizzy hair:

In 2010, a study was published in the International Journal of Cosmetic Science, where researchers clearly stated that using rice water as a hair treatment offered several benefits including improved elasticity, texture and lesser friction and frizz. This is largely due to the presence of inositol, a carbohydrate (31)

2.1.8 RICE WATER FOR FORMULATION OF HAIR PRODUCT:

By using either the soaked, boiled or fermented rice water for hair, you can repair and strengthen damaged hair shaft while providing shine, elasticity and smoothness to the hair. There are a couple of ways to use rice water for hair as a rinse. Here are some of the different ways.

1. As a last rinse: After shampoo and conditioning hair, use the rice water for hair as the last rinse. Take one cup of fermented rice water, one cup of regular water and add five drops of lavender or rosemary oil to this. Pour it over your hair and massage it into the scalp and each strand of hair till the tips. Keep on for five minutes before rinsing it off.

2. As a pre-conditioner: After shampooing the hair, use the rice water for hair. Pour it over hair and massage it into your scalp and hair. It can use fermented rice water with a few drops of essential oil that have beneficial properties for hair. Keep this in your hair for five to seven minutes before the washing off, and then follow it up with a deep conditioner. It could also apply the conditioner before rinsing the rice water for hair off.

3. As a hair mask: There are two ways you can use rice water for hair mask. One is using plain rice water; another is by making a paste to apply as a hair mask. The first way is where you need to first cleanse your hair with a mild shampoo. Then, apply the rice water all over your hair and scalp, and massage it in thoroughly. Cover your hair with a shower cap and keep it on for 15 minutes. Then wash it off using plain water. In the second method, you need to use fermented rice water and add mustard powder to make a paste. Add some olive oil to the paste and mix well. Apply this paste to your scalp. Keep it for 15 to 20 minutes before washing it off.

4. As a shampoo: You can make a home-made shampoo using rice water. Take one cup of rice water and add one teaspoon of shikakai powder to it. Add one-fourth cup of aloe vera juice to this. Add one to two tablespoons of castile soap or baby shampoo to the mix. Mix it all well, and store it in a secure bottle. This lasts for a week in the refrigerator. To use it, use it like the way you would use a regular shampoo.

5. As a co-conditioner: Another way to use rice water for hair is to add it to the hair conditioner. Take a tablespoon of conditioner & a tablespoon of rice water and use this as a conditioner. (32)

2.2 HIBISCUS:

Figure 4: Hibiscus (33)

2.2.1 DESCRIPTION:

The leaves are often lobed and may be smooth or covered in trichomes (plant hairs). The flowers can be borne singly or in clusters, and the flowers of many species last only a single day. An epicalyx (whorl of leaf like bracts that surrounds the sepals) is particularly common, and the stamens are typically fused into a tube. Members of the genus characteristically have spiny pollen, and their fruits are capsules (34)

2.2.2 PLANT:

- Botnical name: Hibiscus rosa-sinensis
- Biological source: It is a species of tropical hibiscus, a flowering plant in the hibisceae tribe.
- Family: Malvaceae (34)

2.2.3 SCIENTIFIC CLASSIFICATION:

- Kingdom: Plantae – plantes, Planta, Vegetal, plants
- Subkingdom: Viridiplantae – green plants
- Superdivision: Embryophyta
- Division: Tracheophyta – vascular plants, tracheophytes
- Subdivision: Spermatophytina – spermatophytes, seed plants, phanérogames
- Class: Magnoliopsida
- Family: Malvaceae – mallows, mauves
- Genus: Hibiscus L. – rosemallow, rose-mallow
- Species Hibiscus rosa-sinensis L. – Chinese hibiscus, shoe-black plant (35)

2.2.4 CHEMICAL CONSTITUENT:

Hibiscus rosa-sinensis contained tannins, anthraquinones, quinines, phenols, flavanoides, alkaloids, terpenoids, saponins, cardiac glycosides, protein, free amino acids, carbohydrates, reducing sugars, mucilage, essential oils and steroids. (36)

2.2.5 PHARMACOLOGICAL PROPERTIES:

- Antidiabetic, reproductive, fibrinolytic, hypolipidemic, antioxidant, anti-inflammatory, antipyretic, analgesic, immuno-modulatory, anticonvulsant, antidepressant
- Memory enhancement, cytotoxic, antimicrobial, antiparasitic, dermatological, anti-haemolytic, urinary, hepatoprotective, neuroprotective, antitussive & many other effects.

2.2.6 IS HIBISCUS GOOD FOR HAIR?

According to Ayurveda, Panchmahabhutas influence your body's constitution in the form of energy. It is classified into three doshas, and each dosha exhibits different characteristics of your hair. The unique ratio of the three doshas reflects healthy hair.

Mostly an individual's hair shows a combination of the attributes of at least two doshas. Some people may likely recognize traits from all the three doshas. Rarely, someone may have only a specific dosha hair type.

Listed below are the hair characteristics of each dosha:

Dosha	Equilibrium State (Prakriti)	Excess State (Vikriti)
Vata (responsible for movement and motion)	Grows quickly, unruly hair condition, thin or coarse in density, a combination of curls and straight strands.	Stunted hair growth, falls out in clumps, dry, brittle, frizzy, lackluster, split ends.
Pitta(responsible for metabolic activity)	Manageable hair, moderate thickness, very fine strands, soft and straight mane.	Damage hair roots by accumulating excess heat, premature thinning & greying,
Kapha (responsible for strength, structure, and lubrication)	Wavy, strong, thick and fuller volume, lustrous texture.	Oily scalp and sticky hair strands.

Hibiscus is rich in vitamin C, flavonoids, amino acids, mucilage fibre, moisture content, and antioxidants. The goodness of hibiscus beautifies your hair by nourishing your locks, promoting the growth of luscious hair, and bringing out a naturally satin-soft texture to your mane.

Hence, hibiscus is a fantastic herb to add to your hair care routine. (37)

2.2.7 BENEFITS OF HIBISCUS ON HAIR:

1. Hibiscus for Hair Growth:

Herbal hair oils are typically a combination of herbal extract such as hibiscus, mixed with a carrier oil base, such as: almond oil, coconut oil, mineral oil, jojoba oil, olive oil, walnut oil, wheat germ oil[18] (18)

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2. Hibiscus Protects Scalp From External Damage:

Hibiscus plants are packed with resilient properties that keep your scalp protected from external stressors. Its impact on your scalp acts as a sunscreen to protect your hair from UVB rays. Cleansing properties of

hibiscus also help balance the pH of your scalp, fight oiliness, build-up of dandruff, and activate your hair follicles

3. Hibiscus for Hair Root Strength:

Hibiscus flowers and leaves are rich in invigorating ingredients - flavonoids & amino acids. Flavonoids enhance blood circulation to your hair follicles, retransform dormant follicles into hair follicles, stimulating new hair growth. Amino acids trigger keratin production in the cells of your hair follicles, encouraging healthy hair growth

4. Hibiscus Delays Premature Greying of Hair:

Elevated Pitta dosha may cause premature greying of hair. Hibiscus is rich in natural pigments, antioxidants, and vitamins that can give a crimson tinge to your grey hair and bring out darker shine to your natural hair colour.

5. Hibiscus Prevents Dandruff:

Excess Kapha may cause oily dandruff flakes, and excess Vata may cause dry dandruff flakes. With anti-microbial properties, hibiscus curbs the growth of dandruff-causing yeast on your scalp, unclogs dandruff flakes from your hair follicles, and prevents dandruff recurrence

6. Deeply Conditions Your Hair:

Elevated Vata dosha makes your hair dry and frizzy with split ends. Hibiscus acts as an ultra-emollient that traps moisture in your hair shafts and restores elasticity in your hair strands. Its mucilage fiber prevents breakage and conditions your hair to make it silky and smooth.

7. Regulates Sebaceous Glands:

Sebaceous glands produce an oily substance called sebum to lubricate your hair. Elevated Kapha dosha triggers excess oil secretion, making your hair oily and sticky. Hibiscus balances the activity of these glands to maintain the natural moisturization of your hair.

2.2.8 METHODS TO USE HIBISCUS:

1. Hibiscus Oil for Hair Growth:

Applying hibiscus, combined with coconut oil, is the easiest way to grow long hair. Coconut oil pacifies Vata Dosha promotes hair growth by reducing protein loss, and moisturizes your hair.

A. Take a bunch (depends upon the size of your hair) of hibiscus petals and leaves and blend them into a smooth paste. You can also use hibiscus powder.

B. Heat up an adequate amount of coconut oil in a saucepan & add the hibiscus paste into it.

C. Continue boiling it until you see powdery particles float to the bottom of the pan.

D. Close the lid and put it aside until it cools down to normal temperature.

E. Grind the flowers and petals to form powder. Follow the above process of boiling it in coconut oil.

2. Hibiscus Shampoo to Prevent Build up:

Excess Pitta dosha accumulates heat in your hair follicles, causing damage and hair loss. Hibiscus pacifies Pitta Dosha, soothes your scalp, and cools down your head. It removes build-up formed by pollutants and chemical residue without stripping away the natural moisture from your hair.

A. Take hibiscus leaves double than hibiscus petals.

B. Boil the leaves and petals in a bowl of water. See that the quantities are sufficient to make a shampoo for your hair.

C. After it cools down, add 1-2 tablespoons of gram flour to it. Gram flour pacifies Pitta and Kapha.

D. Replace your regular shampoo with this herbal blend and wash your hair thoroughly with the natural foam.

3. Hibiscus + Amla Hair Pack for Volumizing Your Hair:

Amla is a tridosha pacifier. It is rich in vitamin C, minerals and nutrients that thickens your hair follicles and promotes thicker and stronger hair. You can make a tonic combining amla and hibiscus to add volume to your hair.

A. Take a bunch of hibiscus petals and leaves and blend them into a smooth paste.

B. Add 1-2 tablespoons of amla powder to the hibiscus paste. Mix it with water to a comfortable consistency to apply it on your hair.

C. Leave the hair pack for 40 minutes.

D. Rinse it off with lukewarm water and take a head bath.

E. Remember to wash your hair with a herbal shampoo as it retains the pack's impact and clears the residue.

F. Do it 1-3 times a week.

4. Hibiscus + Aloe Vera Conditioning Hair Mask:

Aloe Vera pacifies Pitta, balances Vata and Kapha. It moisturizes your hair and works as an intense repair conditioner. Adding it to hibiscus can give your hair a smooth and shimmering texture.

A. Take a bunch of hibiscus petals and leaves and blend them into a smooth paste.

B. Squeeze out fresh aloe vera gel and mix it with the hibiscus paste.

C. Apply it on your whole scalp and spread it evenly from root to tip of your hair. Leave it for around 45 minutes.

D. Rinse it off with lukewarm water before washing your hair with a herbal shampoo.

E. Do it before every hair wash.

5. Hibiscus + Fenugreek Anti-Dandruff Hair Pack:

Fenugreek pacifies Kapha and Vata. Fenugreek can treat dandruff and also strengthen hair roots. Combine hibiscus and fenugreek to make an excellent medicine for curing your dandruff and growing healthier hair.

A. Soak 1-2 tablespoons of fenugreek seeds for a whole day or overnight in water.

B. Grind the soaked seeds along with a bunch of hibiscus leaves and flowers.

C. Bind the paste using 1/4 cup of buttermilk/ curd if you are Vata dominant, coconut milk/cow milk for Pitta dominant, and aloe vera gel for Kapha dominant.

D. Gently massage the paste into your scalp and leave it for an hour.

E. Rinse it off with cold water before washing it with a herbal shampoo.

F. Do it once a week.

6. Hibiscus + Henna Hair Pack for Darker Shine:

Henna pacifies Pitta and Kapha and balances Vata. Henna leaves contain a red-orange dye molecule, lawsone, which gives your hair the orange-red pigment. Adding it to hibiscus can delay the greying process of your hair and enhance its shine.

A. Take a bunch of hibiscus petals and leaves and henna leaves to blend them into a smooth paste.

B. Take half or one whole lemon to squeeze the juice into the herbal paste. Lemon pacifies Vata dosha.

C. Apply the paste to your hair strands from root to tip. Leave it for an hour.

D. Rinse it off with cold water before having a herbal head bath.

E. Do it 1-3 times a month. (37)

III. CONCLUSION

In our present study, we have discussed about benefits of rice water & hibiscus for hair. Rice water is quickly absorb and show multiple benefits that have been proven to get shinier, healthier, fuller hair and have also shown detangling, smoothing, strengthening effect and also useful for treating dandruff & repairing damage caused by hair tools.

Studies found that Hibiscus nourishes our hair & seal it's natural moisture content. Hibiscus leaves & flowers contain high amount of mucilage, which act as a natural conditioner. Hibiscus contain amino acids & vit.C which improves blood circulation under the scalp & boost hair growth.

We have proposed this in theoretical basis, but because of the various advantages of rice water & hibiscus, there is a great scope for further research in this area.

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V. REFERENCES

References

1. *Hair fiber characteristics and methods to evaluate hair physical and.* Maria Valéria Robles Velasco, Tania Cristina de Sá Dias, Anderson Zanardi de Freitas,Nilson Dias Vieira Júnior,Claudinéia Aparecida Sales de Oliveira Pinto, Telma Mary Kaneko, André Rolim Baby. january- march : s.n., 2009, Brazilian Journal of. Pharmaceutical Sciences , Vol. 45.

2. *Human Hair and the Impact of Cosmetic Procedures: A Review on Cleansing and Shape-Modulating Cosmetics.* by Célia F. Cruz, Cristiana Costa,Andreia C. Gomes ,Teresa Matamá ,and Artur Cavaco-Paulo. 3, 2016, Multidisciplinary Digital Publishing Institute(MDPI), Vol. 3.

3. What is the structure of hair and how does it grow? *NCBI.*

4. KERATiN RESEARCH.

5. *Exogen, Shedding Phase of the Hair Growth Cycle: Characterization of a Mouse Model.* Yoram Milner, Michael Kashgarian,James Sudnik,Mario Filippi,Menas Kizoulis,Kurt Stenn. 3, 2002, Journal of investigative dermatology, Vol. 119.

6. *Complex hair cycle domain patterns and regenerative hair waves in living rodents.* Plikus MV, Chuong CM. s.l. : PubMed.Gov, may 2008, journal of investigative dermatology.

7. *ageing of hair follicle pigmentation system.* DJ, Tobin. 2, s.l. : Int J Trichology, july 2009, Vol. 1, pp. 83-93.

8. *hair follicle terminal differentiation is orchestarted by distint early and late matrix progenitors.* Mesler AL, Veniaminova NA, Lull MV, Wong SY. 4, s.l. : cell Report, april 2017, cell report, Vol. 19, pp. 809-821.

9. *Dermal adipocytes and hair cycling: is spatial heterogeneity a charecterstics features of dermal adipose adipose tissue depot?* Kruglikov IL, Schere PE. 4, s.l. : Experimental Dermatology, april 25, 2016, Vol. 25, pp. 258-62.

10. *Resting no more: re-defining telogen, the maintenance stage of the hair growth cycle.* Geyfman M, Plikus MV, Treffeisen E, Anderson B paus R. 4, november : Biol RevCampPhilos Soc, 2015, Vol. 90, pp. 1176-1196.

11. *Human hair follicle bulge cells are biochemically distinct and possess an epithelial stem cell phenotype.* S Lyle, M Christofidou-Solomidou, y Liu, D E Elder, S Albedla, G cotsarelis. 3, december 1999, Journal of Investigating Dermatol Symposium Proceedings, Vol. 4.

12. *hair follicle:a novel source of multipotent stem cells for tissue engineering and regenerative medicines.* Panagiotis Mistriotis, stelios T Andreadis. 4, s.l. : tissue engineering paret B review, august 2013, Vol. 19, pp. 265-278.

13. *In vitro differences between keratinocyte stem cells and transit-amplifying cells of the human hair follicle.* 6, s.l. : journal of investigative dermatology, december 2005, journal of investigative dermatology, Vol. 125, pp. 1099-1105.

14. Martel, Julianna L. and Julia H. Miao, Talel Badri. *Anatomy, Hair Follicle.* s.l. : StatPearls, 2018.

15. YC Hsu, Pasolli HA, Elaine Fuchs. Dynamics Between Stem Cells, Niche and Progeny in the Hair Follicle. january 2011, Vol. 144, 1, pp. 92-105.

16. *New activators and inhibitors in the hair cycle clock: targeting stem cells' state of competence.* Plicus, Maksim V. 5, journal of investigative dermatology, Vol. 132, pp. 1321-1234.

17. *Promotion of anagen, increased hair density and reduction of hair fall in a clinical setting following identification of FGF5-inhibiting compounds via a novel 2-stage process.* Dominic Berg, Masakumi yamamoto,Masato Namekata, Joseph Haklani, Koichiro Koike, maria Halasz. s.l. : PubMed. Gov, february 27, 2017, Clinical, cosmetic and investigational dermatology, pp. 71-85.

18. Marlon R Schneider, Ruth Schmidt-Ullrich , Ralf Paus. The hair follicle as a dynamic miniorgan. *PubMed.Gov.* february 10, 2009, Vol. 19, 3.

19. *From telogen to exogen: mechanisms underlying formation and subsequent loss of the hair club fiber.* Claire a Higgins, Gillian E Westgate, Colin A B Jahoda. 9, september 2009, journal of investigational dermatology, Vol. 129.

20. *Identifying Quiescent Stem Cells in Hair Follicles.* Rodriguez, Christine N. 2018, method in molecular biology, pp. 137-147.

21. *ANNOVAR: functional annotation of genetic variants from high-throughput sequencing data.* Kai wang, Mingyao Li, Hakon Hakonarson. 16, september 2010, Nuclic acid research, Vol. 38.

22. Erdoğan, By Bilgen. *Anatomy and Physiology of Hair.* 2017.

23. *Telogen effluvium.* S Harrison, R sinclair. 5, july 2002, clinical and experimenta dermatology, Vol. 27.

24. Bent, Melissa. Nutrition and hair health. *the trichological society.*

25. Burgess, Lana. What does rice water do for your hair? *NEWSLETTER.* 2018.

26. *Rice-Traditional Medicinal Plant in India.* . M. Umadevi, R. Pushpa, K.P. Sampathkumar, Debjit Bhowmik. 1, May 2012, Journal of Pharmacognosy and Phytochemistry , Vol. 1, pp. 6-12.

27. *Oryza sativa L.* s.l. : ITIS Report.

28. *A FORMULATION OF FACE PACK AND HAIR PRODUCTS OF RICE WATER FOR THE USE OF FACE AND HAIR PROBLEM.* . Prachi D. Barsagade, Pranali Patil and Dr. Milind J. Umekar. 4, JANUARY 22, 2020, Vol. 9, pp. 683-694.

29. Does Rice Water Make Your Hair Grow?

30. Jaychander, Neeti. The benefits of rice water for hair and skin.

31. Patwardhan, Radhika Sathe. may 7, 2019.

32. Joana Marto ID, Angela Neves , Lidia Maria Goncalves ID, Pedro Pinto, Cristina. Rice Water: A Traditional Ingredient with AntiAging Efficacy Cosmetics. 2008.

33. Koganti, Sindhu. 15 Effective Ways To Use Hibiscus For Your Hair. *STYLECRAZE.* 16 Feburary 2021.

34. Britannica, The Editors of Encyclopedia. Hibiscus.

35. Hibiscus rosa-sinensis L. *ITIS Report.*

36. Al-Snafi, Ali Esmail. Chemical constituents, pharmacological effects and therapeutic importance of Hibiscus rosa-sinensis- A review. *ResearchGate.* August 2018.

37. Gandhi, Dr.Zeel. 6 Effective Ways To Use Hibiscus For Hair Growth. *Vedix.* Octomber 20 2020.

38. Frothingham, Scott. BENIFITS FOR HIBISCUS OILS FOR HAIR. *HEALTHLINE.* MARCH 31, 2020.

39. *Rice-Traditional Medicinal Plant in India.* M. Umadevi, R. Pushpa, K.P. Sampathkumar, Debjit Bhowmik. 2012, Journal of Pharmacognosy and Phytochemistry, Vol. 1, pp. 6-7.