

Review Article**Ayurvastra: An Innovative Alliance of Ayurveda and Textile: A Review****Farida P. Minocheherhomji^{1*}, Bhumika Solanki²**¹Associate-Professor, Microbiology Department, B.P. Baria Science Institute, Navsari-396445, India²Adhoc-Lecturer, Microbiology Department, B.P. Baria Science Institute, Navsari-396445, India***Corresponding author**

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Abstract: Adaptation of covering our bodies pre-dates to the historic age. Clothes have fulfilled a variety of functions, ranging from primarily awarding protection and warmth to being a symbol of fashion statement as of today. In recent years, due to aggravation in health related issues, the collaboration between medical personnel and textile chemistry technologists has led to the evolution of innovative medico-functional applications for textiles. Enhancement of beauty through healthy and eco-friendly means is the demand of the day. Now people prefer apparels with additional extra functions like imparting fragrance with protection, maintaining freshness by anti-creasing capability, leading to a smart appearance, and also helping in nurturing a healthy life by herbal means. This concept finds its origin from Ayurveda, wherein herbal extracts have been found to be used for curing ailments. This is achieved by the addition of cosmetic and pharmaceutical herbal ingredients into the clothing, which then gains entry into the body through the skin by the natural movements of the body. Thus the skin is refreshed, revitalized and cured.

Keywords: Ayurveda, Ayurvastra, Medicinal Herbs, Textiles.

INTRODUCTION

Humans are basically and intellectually different from other living beings, due to the exceptional development of their brain-cells. This difference in the primates led to different discoveries in all the spheres leading to their initial survival and later on to gaining control and supremacy on all other living beings. Hence even an eight ton elephant obeys all the commands of his keeper who is even less than one percent of his body weight and so nowhere near his physical strength.

Adaptation of covering the bodies is evident even in ancient uncivilized humans by plant leaves and bark or shell. This may be due to defending their bodies from the attack by other organisms and animals. Improvement in civilization led to proper covering of the bodies, and out of various sources man found natural cotton to provide a good and durable covering. Work on this aspect of usage of cotton for the benefit of mankind has been refined in all these years to near perfection.

Since all these years, modifications have been brought about in various processes to make the cotton fabric more comfortable to the wearer. Evolution of Ayurvastra can be very safely considered to be one such modification.

Ayurvastra is a branch of ancient Indian herbal medicinal repository, Ayurveda, the ancient Vedic health care system predating more than 5500 years, prescribes the use of Ayurvastra cloth to cure a number of diseases like diabetes, skin infections, psoriasis, eczema, hyper tension, asthma, arthritis, high blood pressure, rheumatism, arthritis and cardiac problems. It is an ancient technique prevalent before textile industrialization to dye cloth with herbal dyes, which then acts as a barrier to the attack of various microorganisms. Such a fabric is free from all synthetic toxic chemical substances, and is also fully eco-friendly and biodegradable. The colors used are obtained from medicinal plants only leaving no scope for the incorporation of synthetic dyes. Ayurvastra helps the skin which being the outer covering of the body in its function to prevent the entry of all foreign toxic substances which are lethal to the human body. The herbs incorporated in the fabric release their medicinal properties onto and into the body thus providing medicinal immunity against different harmful toxins. Ayurvastra clothing is made from organic cellulosic fabric that has been previously treated with Ayurvedic oils and herbs, which accelerate health and cure various diseases depending on the blended oils and herbs. These fabrics also have anti inflammatory properties and the best time of its usage is when the body is at rest like during sleep, meditation or relaxation as the functions of the body are mainly diverted towards healing activities. Hence, Ayurvastra cloth is generally used in

mats meant for sitting and sleeping, pillow covers, bed sheets, towels, sleepwear and clothes used during meditation and prayers. These benefits of Ayurvedic clothing have been due to it helping the human body in maintaining the balance between various bodily processes. Diabetes has been observed to have been controlled by a combination of the herbal dye with shoe flower, cumon or cumin seeds, champa flower and *Mimosa pudica*. Similarly curry leaves blended in the herbal dye are beneficial in curing arthritis; whereas sandalwood, turmeric and neem are beneficial in case of skin diseases. In many cases more than 35 different herbs obtained from bark, leaves, stem, flowers and seeds of different plants are applied on to the fabric by soaking them in carefully controlled conditions. It has also been observed that the cloth previously treated with cow urine before the application of the herbal formulations show better effect due to the antiseptic nature of cow urine.

The minute particles of active chemicals like fragrances, skin care products, and medicinal items that are embedded in the capsules are released on the account of body heat when the cloth comes into the contact of the body. These products are readily absorbed by the skin leading to quick beneficial effects, as the toxins in the body are either removed or neutralized. All the ingredients of Ayurvedic are devoid of any synthetic toxic chemicals and are bio degradable; hence it protects the environment from pollution and damage.

Organic fibers with herbal applications are

- Cotton and Silk: Bed sheets, nightwear for children and adults.
- Wool: Woolen clothes, mats.
- Coir and Jute: Carpets, rugs, Mats.
- Hand loom produce: Shawls, blankets, dhotis.

Hence it can be safely concluded that Ayurvedic is the doctor of future, unlike Allopathic doctors who prescribe medicines after infliction of a disease, act before hand to prevent the infliction of different diseases [1].

The processing of Ayurvedic from woven fabrics

- Bleaching incorporating a mixture of natural bleaching agents and dipped in Ayurvedic concoctions using dung of animals like camel, buffalo, cow, sheep lasting four hours to several days under controlled temperatures for efficient scouring & bleaching the gray cloth. The hand loomed cloth is also washed using natural mineral-rich water and sea salts to remove the sizing materials, gums and oils that were added to facilitate spinning process.
- The second processing step is mordanting to enhance the tinctorial value of the dyes that are later applied on to the fabric. The preferred natural mordants are the barks of Lodhra

(*Symplocos racemosa*), Kenduka (*Diospyros ebenum*), fruit extracts of Haritaki (*Terminalia chebula*). Alum clays and iron clays are also used as mordant. But mordants like copper, chromium, zinc, tin are strictly avoided due to their creating environmental problems.

- The organic cotton yarn or fabric is then immersed in a carefully controlled mixture of herbal preparations called 'Kashayas' depending upon the disease or ailment that is to be taken care of. Here it is referred by the word 'medication' instead of dyeing because here the products used serve the major function of medicines, at the same time also imparts color to the fabrics. The temperature of the Kashayas, their time duration and number of the medicinal soaks, including the blend of herbs and the equipment are carefully used in a controlled manner. The medicated cloth is later allowed to cool and is repeatedly washed to remove the unfixed dye/medicinal ingredients, followed by strictly drying in shade. Kachuka Aata or Guar gum and TKP are used as a medium in printing the fabric. Ayurvedic clothes can be produced in all kinds of hues of red, yellow, green, blue, orange, brown, ivory and black.

Antimicrobial finish

Cotton fabrics by their water absorbent capability, absorb human perspiration, thus increasing the comfort feel of the wearer. The humid Indian climatic conditions lead to perspiration which is an excellent ground for the growth of microorganisms, which is not visible to the human eye, but shows its presence by the foul odor emitted from the fabric. This has to be curbed by the application of antimicrobial finishes on to the fabric during the final processing stage to impart better antimicrobial properties to it.

Antimicrobial finishes are generally prepared from inorganic/organic products, which are costly to manufacture as they require a large amount of energy sources, causing permanent depletion of these sources and also man power. Nowadays the trend is towards the use of plant based products to act as good antimicrobial agents.

Research in this aspect has led to the manufacture of products from naturally available plants like *michelia × alba*. The leaves of the plant were cleaned with water, dried in shade, and then ground to a fine powder. The powder was then soaked in methanol in a closed container overnight to let dissolve the natural ingredients in the solvent. The solution was then filtered, and the alcohol in the filtrate was allowed to evaporate in air, thus obtaining a condensed extract.

This extract was then added to water in proper proportions, and it is applied on to the fabric by a 3-

bowl padding mangle, followed by drying at 80-100 °C, and later on curing in dry heat at 120-130 °C. This imparts wash durability to the fabric to certain washings like 50-100 which are quite sufficient to last to the service life of the fabric. The antibacterial/antifungal property was checked by taking a required amount of dry powder with methanol. The extract was finished on the fabric by dip dry method and tested for its Antimicrobial activity on *Staphylococcus*, *Escherichia coli* and *Aspergillus niger* against some conventionally available products. The tests have shown the plant extract based antimicrobial agent to have an upper hand compared to its conventional counterpart in curbing microbial growth of the above mentioned organisms.

It has been concluded that *michelia x alba* herbal extracts are eco-friendly, bio-degradable and non-toxic to the skin when they are incorporated on to the fabrics. Apart from the industrial use, antimicrobial finish on textiles has become essential in the day today life of people, so that we can have a life free from diseases and a hygienic atmosphere. The finish thus has an excellent potential to be incorporated in various textile uses like in the manufacture of baby care/ diaper products. The 100% gel treated fabric was found to be the best of all the samples [2].

Recent procedures adopted for incorporating herbal drugs and oils in textiles

An ideal finishing agent to be applied on to a fabric must satisfy several requirements, of which the basic and important are their broad spectrum of activity and to possess nil to very low toxicity to the wearer. Here, Nano technology which involves the micro encapsulation technique in which tiny droplets of products to be applied on to the cotton fabric such as moisturizers, fragrances, deodorizers ,vitamins, retardants and repellents are packed in microscopically small capsules sealed hermetically thereby preserving them. It is critically important that micro-en-capsules remain stable and durable. The diameter of capsule varies from 1mm depending upon the application; an area of 1sq cm would contain 1 million capsules. Nanotechnology is defined as the study and use of structures between 1 nanometer and 100 nanometers in size. Treating a cotton fabric or the fibre itself in yarn stage with nano-sized particles allows improvement of fabric properties without a significant increase in weight, thickness, or stiffness as might have been the case with those techniques that are not based on nano particle technology. The basic point that was noted in the finishing techniques to improve wickability, was that no improvement was observed in the warp direction whereas, the microencapsulation enhanced the wickability in the weft direction of the fabric structure. The findings of the wickability test (minutes) of dip, microencapsulated and nano- encapsulated finished fabric was evaluated after 10, 20, and 30 washes; from the statistical analysis, it is evident that there is no significant difference between the groups with respect

to fabric warp at 5% level and in weft count there was a significant difference between the groups at the 5% level.

In this study 100 %cotton fabric was treated with herbal concoctions of Amanakku, Amman Paccharisi and Avaram by dip, pad, dry, cure technique, whereby micro-encapsulation was accomplished. The wickability of the treated fabric was analyzed after 10, 20, 30 washes. It was concluded that wickability improved in the weft direction due to micro-encapsulation, while in the warp direction there was no significant improvement.

After the procedure it was identified by the investigator that the finishing technique by the dip, microencapsulated and nanoencapsulated finished fabric was evaluated after 10, 20, and 30 washes in the hundred percent cotton denim fabric possessed. The wickability timing was decreased initially in warp direction, and in weft direction, increased on washing, in all the three finishes; by which it had been deciphered that the finish had no say, in absorbency property [3].

Numerous herbs like chocolate, tulsi, brier rose, indigo, red riding hood (mix of spices) can be used for the preparation of ayurveda. The so treated fabric has a aroma with medicinal properties. Ayurveda is also marketed as “cosmetotextiles” on a broad term, has found application in treating a number of diseases like diabetes, arthritis, skin infections, hyper tension, hay fever. Results by using sensorial evaluations showed that performance of such Garments prepared from thus treated fabrics exhibited prominent medicinal effect for more than 30 days. Apart from microencapsulation, liposomes, dyes and coated textile technology are the recent procedures adopted for incorporating herbal drugs and oils in textiles. The dye-bath temperature, the time duration including the number of the dye soaks, the mixture of herbs, and even the equipment used are carefully selected and standardized after extensive trials. Proper washing of the grey fabric, followed by desizing and bleaching is a must before dyeing in order to attain a uniform pickup of the dye by the fabric. Harita, madder, turmeric, Indigo, Pomegranate, onion, Tulsi, Mint, Lavender, Ginger and a much more wide range of herbs and plants have been used .

Effects on Body

Research has shown a vitalizing effect as the person feels fresh and healthy. Selected herbal ingredients in the textiles have been found to cure diseases like arthritis and Hay fever, as it supplements and improves the natural function of the skin to block and resist harmful chemicals and toxins from entering the body [4].

Many health related disorders have been found to originate from the fabrics that are used to cover our

bodies. Starting from minor allergic reactions, some groups of dyes that are used in dyeing or printing of the fabric have been found to promote skin cancer in the wearer. So textile producers face various challenges, and their production is to be centered with the selection of healthful ingredients. Ayurveda or the medical dress is one of the major option of using 100 per cent pure Organic cotton or silk, wool, jute and coir products that are woven on hand looms, followed by dyeing using various Ayurvedic herbs possessing medicinal qualities, thus being free from toxic chemicals, rendering them free from toxins and irritants. Ayurveda can be safely used as an Ayurvedic treatment for diseases like diabetes, skin infections, hypertension, asthma, arthritis and also for overall boosting of human immunity. Such fabrics have successfully undergone medico trials in institutes of repute. It has been deduced that as these herbal textiles raise the immunity levels, the body attains a better and certain higher state of Mental and physical equilibrium.

The dyeing procedure attempts to keep medicinal properties intact in the textiles. Dye fixation is accomplished using natural and harmless products having good medicinal properties. The process is done in systematic steps to standardize the quality and quantity of colors, thus achieving better consistency in

longer running output from one end to the other. Innovations in the process has made it possible to dye all natural fibres such as cotton, jute, linen and silk in both woven and knitted fabrics. There are two processes for making Ayurveda. Firstly, the yarn is treated before weaving, or secondly, the fabric is dyed after weaving. Herbal dyes are also directly applied onto textile fibers before weaving like raw fiber, or on to woven fabrics, knitted fabrics and non woven fabrics including stitched garments. The time duration of the manufacture of Ayurveda may be from three to seven days depending upon the applications it is intended to be used.

India has a vast reserve of more than 20,000 species of higher plants and one third of them are categorized to be endemic, while 500 species exhibit prominent medicinal values [5]. The incorporation of these medicinal herbs in Ayurveda renders a lot of therapeutic value to them. Thus, the fabric is very effective for people suffering from anaemia, arthritis, asthma, diabetes, heart related ailments, HIV AIDS, hypertension, respiratory problems, skin infections and its related allergies, and to people encountering sleep disorders, and also for boosting the over-all body immunity depending upon the herb used in the application [6, 7].

Some of the medicinal ingredients that are incorporated in the Ayurveda fabric with their prominently effective medicinal properties are [8-13]

Sl. No.	Medicinal Product	Medicinal Properties
1.	<i>Aloe vera/Ghrithumari</i> (<i>Aloe barbadensis</i>)	Highly effective in cure of infections, wounds and burns, HIV / AIDS.
2.	<i>Brajil wood / Pathan Bakkam</i> (<i>Caesalpinia braliensis</i>)	Acts as a blood purifier, thus improves complexion and also cures various skin diseases.
3.	<i>Castor/Rendi (Ricinus communis)</i>	The oil contains strong insect repellent properties, maintains temperature of the skin, thus facilitating body transpiration.
4.	<i>Cateccu / kattha</i> (<i>Unsaria gambir</i>)	Controlling the occurrence of pimples.
5.	<i>Harad</i> (<i>Terminalia chebula</i>)	Acts as an antiseptic and due to its excellent blood purifying properties, curb dermatitis.
6.	<i>Chireta/ Chirayata</i> (<i>Swertia chiraata</i>)	Cures various skin diseases.
7.	<i>Cumin / Jeera (Cuminum cyminum)</i>	Oil from its seeds is effective against eczema.
8.	<i>Golden Champa / Champa</i> (<i>Michelia champaca</i>)	Excellent in getting relief from burning sensations from skin diseases, allergics and sores. It imparts yellow colour to the fabric when its flowers release the same on boiling.
9.	<i>Guar Gum / Guar</i> (<i>Cjamopsis tetragonaloba</i>)	It regulates body transpiration, curbs body infections.
10.	<i>Henna / Mehndi (Lawsonia inermis:</i>	Henna is age-old blood purifier, with anti-irritant and deodorant properties. It is also a good antiseptic, hence is used for skin irritations, rashes and allergies caused by the extreme Indian heat, simultaneously cooling the body.
11.	<i>Indian Basil / Tulsi</i> (<i>Ocimum sanctum</i>)	Controls viral and bacterial infections. Its essential oil is an antiseptic and insect repellent property, while paste of its root gives relief from bites and stings.
12.	<i>Indian Gentian / Kalmegh</i> (<i>Andrographis paniculata</i>)	A good blood purifier and anti-viral substance
13.	<i>Indian Gooseberry / Amla</i> (<i>Emblica officinalis</i>)	It is a rich source of Vitamin C. Due to its antioxidant properties, it stimulates healing due to fungal, bacterial, and

		viral attacks and stimulates the bodies' immune system.
14.	<i>Indian Madder/Madder (Rubia cordifolia)</i>	It curbs blood impurities and gives relief from various skin diseases.
15.	<i>Indian Mulberry, Noni / Al (Morinda dtrifolia)</i>	The dye obtained from root bark imparts a yellow, reddish purple and brown hue in making batik prints on cotton, wool and silk. It has good blood purifier properties and stimulates wound healing.
16.	<i>Indian Podophullum / Bankakadi, Nirbash (Podophyllum emodi, Podophyllum hexandrum)</i>	Its rhizome is used in curing skin diseases, cuts and wounds.
17.	<i>Indigo/Neel (Indigofera tinctoria)</i>	It has antiseptic, anti allergic properties, so is effective in curing skin diseases.
18.	<i>Lime/Nimbu (Citrus medica)</i>	It is a powerful disinfectant and an astringent against sebaceous secretions. A mixture of lime juice and rose water is a popular body coolant and skin tonic.
19.	<i>Long pepper / Pippali (Piper longum)</i>	Its fruit is used to cure leprosy.
20.	<i>Mahua/Mahuva (Madhuca longifolia, Madhuca indica)</i>	The bark, leaves, flowers and seeds are used for varied medicinal purpose. Decoction of the bark is applied in curing itch; the seed oil is efficacious in treating skin ailments. It is administered internally in diabetes. Leaves being astringent, their ash mixed with butter is applied on burns and scalds.
21.	<i>Marigold / Genda, Zergul (Calendula officinalis)</i>	Flowers promote skin health; used to cure skin disease.
22.	<i>Margosa (Azadirachta indica)</i>	It has good antiseptic and disinfectant properties; its stem bark, leaves and root bark act as blood purifier and is useful in many skin ailments like eczema, psoriasis, rashes, leprosy. Also soothes scabs with clearing away scars.
23.	<i>Monkey Face Tree / Kamala, Kamela (Mallotus philippinensis)</i>	The red glandular and hairy substance separated from the fruits is used as anti Uergenic, and astringent to cure scabies, cutaneous infections and to destroy tapeworms and ringworms.
24.	<i>Onion I pyaaj (Aluum cepa)</i>	Its helps to give relief from skin disease.
25.	<i>Peanut oil / Mur^hali (Arachis hypogea)</i>	It promotes body freshness.
26.	<i>Pomegranate / Anar (Púnica granatum)</i>	It is effective in providing relief from tapeworms by paralyzing them, thus they are easily expelled from the body. The plant is also rich in tannin, which makes it an effective astringent. The bark has prominent antibacterial, antiviral and astringent properties.
27.	<i>Rose / Gulab (Rosa damascena, Rosa centifolia)</i>	Rose water and oil are good astringent to clean and tone up the skin.
28.	<i>Safflower / Kusum (Carthamus tinctorius)</i>	Finds application in skin care; Florets and seeds release red and yellow dyes for application on cotton and wool fabrics.
29.	<i>Saffron / Kesar (Crocus sativas)</i>	Cures pimples, and gives relief from rashes.
30.	<i>Sandalwood / Chandan (Santalum album)</i>	It gives cooling sensation to skin, and maintains skin health. It has antiseptic, anti-inflammatory and Styptic properties, capable of stalling local bleeding in cuts wounds; helps in curing skin itching, prickly heat, burns and heat rashes.
31.	<i>The Indian laburnum / Amaltas (Cassia fistula)</i>	Its leaves, stem bark, and fruit pulp have antibacterial properties. The root possesses antifungal activity and the essential oils extracted from various parts of the tree promote antiviral properties. The bark and leaves are ground into a paste to treat chronic skin infections.
32.	<i>Tinospora / Gelqy (Tinospora cordifolia)</i>	Its root and bark are used to cure various skin diseases.
33.	<i>Touch-me-not / Chhui-Mui, Lajwanti (Mimosa púdica)</i>	The roots, leaves and flower heads have medicinal properties, rendering it suitable in treatment of leprosy, inflammations,

		burning sensations.
34.	<i>Turmeric / Haldi</i> (<i>Curcuma longa</i>)	It contains curcumin having bactericidal, antiaUergenic, antiseptic and anti-inflammatory properties. Curcumin is also responsible for the bright yellow color of the turmeric. Acne, skin ulcers and wounds are rapidly healed by the application of turmeric paste due to its antiseptic properties. It cleans and disinfects the skin with a moisturizing effect by retaining its natural oils. Effective in the treatment of HIV / AIDS due to it creating anti-agents.
35.	<i>Woad Vat / Palash</i> (<i>Butea monosperma</i>)	Its flowers have astringent properties, thus cure various skin diseases. The red colored gum called Bengal kino or butea gum and the seeds are used in treatment of roundworms and tapeworms.
36.	<i>Indian Basil / Tulsi</i> (<i>Oscimum sanctum</i>)	Effective in the treatment of HIV /AIDS.
37.	<i>Winter Cherry, Indian ginseng /</i> <i>Ashwagandha</i> (<i>Withania somnifera</i>)	Effective in monitoring health and prolonging longevity. It is also a most important components in HIV / AIDS treatment due to the presence of alkaloids: Withanin, Somniferine.

Fabric Performance Testing

Research is also being done to check the changes in the performance properties and features of the fabric after herbal dye application. The warp and weft tensile strength, elongation and tearing strength are the main factors of concern, as any deterioration in these values will render the fabric unsuitable for clothing. The second aspect of concern is the Air permeability of the fabric, with a soft handle/finish, which should remain as high as possible in order to satisfy the comfort feel of the wearer. Color change is also a factor that has to be kept in mind, as dulling or change of tone of the original color will also render the fabric to be unacceptable due to aesthetic reasons. The last main factor is the washing fastness of the herbal dyes. On repeated washings, it has been observed that the applied herbal dyes tend to bleed off the fabric, particularly at certain portions of the fabric where the fabric comes in constant direct and abrasive contact of the skin of the wearer. This leads to dark-light fading patches on the garment, making it unacceptable in terms of aesthetic value, as well as simultaneous drop in the medicinal effect it is intended to impart to the wearer.

Production cost of Ayurvastra matches or even is on the higher side compared to normal fabrics. As different ailments require different herbs for their cure, so only a single fabric cannot suffice all the ailments. According to the Brine Theory of Dissolution and Absorption, there is a limit for any solvent to dissolve a single solute or a number of solutes. Similarly, all fibers have a particular absorption limits, and on exceeding the same, no further dye / herbal product can be absorbed or retained by the fiber. So many different herbal dyes cannot be applied on to a single fabric, thus necessitating processing of small lots relevant to different ailments, leading to a direct escalation of output costs. Also, the poor fastness properties of the applied herbal dyes raise questions on the economic

viability of the fabric. This factor of low economic viability is more enhanced as the natural fiber fabrics degrade faster than the synthetic fiber. Hence, people are unwilling to adopt the same unless medical circumstances compel.

Hence, it can be safely concluded that this drawback of durability is the topic of main concern which requires to be addressed on priority basis [5].

CONCLUSION

Ayurvastra is climbing the popularity graph as its tentacles have crossed geographical limits. With people becoming increasingly health conscious, the Ayurvastra fabric is dyed using Ayurvedic herbs, Sandalwood, Neem and Turmeric to be an honored royal medicinal dress.

Ayurvastra reinforces the importance of sustaining the planet and its resources for the future generations as well as the well-being of the current generation, using age-old practices which do not add up to global warming, but on the contrary helps in minimizing it. It is expected that this unique technology will open a new arena of entrepreneurship and job opportunities, which will lead to better economical stability and sustenance, to be welcomed by the society as a whole [15].

Scope for Ayurvastra is endless, and it is the way to keep people healthy. This principle is used to maintain good health by adopting a healthy way of life. It has stated receiving awareness from all the parts of the world.

National and State government agencies in India considers Ayurvastra as a natural way to revitalize and increase the market for their hand-loom industries by optimizing its production with improvement in the

shortcomings and draw-backs for a better quality, thus creating a niche for their eco-friendly handloom fabrics. The Indian government hopes that this partnership will help to create a platform for education and implementation of Ayurveda as a sure alternative to synthetics, thereby an increase in business resulting in a stable economy providing sustenance and livelihood to millions of people.

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