

Life Saving Bindi a novel approach to Combat Iodine Deficiency

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ABSTRACT

The thyroid gland produces thyroid hormones. The two most important hormones are tetraiodothyronine (thyroxine or T4) and triiodothyronine (T3). Iodine deficiency is a major health problem in India. Iodine deficiency that can lead to disorders like goiter, hypothyroidism and even brain damage. Even mild iodine deficiency in pregnant women can result in children being born with cretinism and mental retardation. The most popular method of tackling the problem has been to encourage the consumption of iodised salt. An iodine patch, designed like a regular bindi, is expected to help iodine deficiency. It seems like a brilliantly simple idea. The wearing of bindis form part of a cultural practice of Indian Women, which are "self-adhesive" in between their eyebrows, have been impregnated with a solution of iodine. Production costs are minimal, wearing the iodine-infused bindi requires no behavioral change. Conclusion: Incorporation of medicine into lifestyle habits and daily practice through novel approaches should be encouraged like Iodine Bindi in the management of other chronic diseases.

KEY WORDS: Thyroid gland, Triiodothyronine, Tetraiodothyronine, hypothyroidism, Iodine, Bindi.

INTRODUCTION

The thyroid gland is located in the front of the neck attached to the lower part of the voicebox (or larynx) and to the upper part of the windpipe (or trachea). It has two sides or lobes. These lobes are connected by a narrow neck (or isthmus). Each lobe is about 4 cm long and 1 to 2 cm wide. The name "thyroid" comes from the Greek word which means "shield".

Thyroid Hormones:

The thyroid gland produces thyroid hormones. These are peptides containing iodine. The two most important hormones are tetraiodothyronine (thyroxine or T4) and triiodothyronine (T3). These hormones are essential for life and have many effects on body metabolism, growth, and development.⁽¹⁾

Recommended Daily Intake of Iodine:⁽²⁾

Age or population group a	U.S. Institute of Medicine	Age or population group	World Health Organization
Infants 0–12 months	110-130	Children 0-5 years	90
Children 1-8 years	90	Children 6-12 years	120

Children 9-13 years	120	Adults >12 years	150
Adults ≥14 years	150	Adults >12 years	150
Pregnancy	220	Pregnancy	250
Lactation	290	Lactation	250

ROLE OF IODINE IN THYROID PHYSIOLOGY

Iodine is a trace element in soil and water that is ingested in several chemical forms. Most forms of iodine are reduced to iodide in the gut. Iodide is nearly completely absorbed in the stomach and duodenum. Iodine is cleared from the circulation primarily by the thyroid and kidney. Under normal circumstances, plasma iodine has a half-life of approximately 10 hours, but this is shortened if the thyroid is overactive, as in iodine deficiency or hyperthyroidism. The mean daily turnover of iodine by the thyroid is approximately 60-95 µg in adults in iodine-sufficient areas. The body of a healthy adult contains from 15 to 20 mg of iodine, 70%-80% of which is in the thyroid. In the basolateral membrane of the thyroid cell, the sodium/iodine symporter (NIS) transfers iodide into the thyroid across a concentration gradient 20-50 times that of plasma by active transport.

Degradation of T4 and T3 in the periphery releases iodine that re-enters the plasma iodine pool. Most ingested iodine is eventually excreted in the urine. Only a small amount appears in the feces.

The mammary gland concentrates iodine and secretes it into breast milk to provide for the newborn. The salivary glands, gastric mucosa, and choroid plexus also take up small amounts of iodine. Iodine deficiency is a major health problem in India. The soil of the subcontinent has little iodine, so food grown on it shows few traces of the element. As a result, all Indians are prone to iodine deficiency disorders. The most popular method of tackling the problem has been to encourage the consumption of iodised salt, which reaches about 91% of Indian households. Even so, some 350 million people remain at risk of iodine deficiency disorders that can lead to goiter, hypothyroidism and even brain damage. Even mild iodine deficiency in pregnant women can result in children being born with cretinism and mental retardation. ⁽³⁾

EPIDEMIOLOGY

Internationally, 2.2 billion people worldwide are at risk for iodine deficiency disease (IDD). Of these persons, 30-70% have goiter and 1-10% have cretinism. The clinical disorders of iodine deficiency tend to be more profound in geographic areas associated with coexisting selenium and vitamin A deficiencies and in regions where goitrogens, such as cassava or millet, are major staples of the diet.

Race-, sex-, and age-related demographics:

No race predilection exists for IDD; prevalence is affected only by geographic area and diet. After age 10 years, the prevalence of goiter is higher in girls than in boys in areas of iodine deficiency. No sex-based difference is observed in the incidence of cretinism.

Patients of any age can be affected by iodine deficiency. The most devastating complications of iodine deficiency disorder occur when iodine is deficient during fetal and neonatal growth. ⁽⁴⁾

IODINE PATCH AS REGULAR BINDI

Most people across the United States and throughout the developed world get their body's requisite dose of iodine by way of their diet (think "iodized salt"). For those whose diets don't provide enough of this hormone-regulating chemical,

supplements can help boost the body's iodine levels. In parts of rural India, however, those supplements can be both prohibitively expensive, and hard to come by. ⁽⁵⁾

Women in India have been sporting small dots between their eyebrows since the third or fourth century. The mark is called a bindi and is a Hindu tradition. ⁽⁶⁾

This attempt is being materialized through "daily dose" of iodine incorporation into the traditional Bindis. The wearing of bindis form part of a cultural practice of Indian Women, which are "self-adhesive" in between their eyebrows, have been impregnated with a solution of iodine.

For age immemorial, in Hindu culture, the bindi has been symbolizing a chakra, or the point of energy, among other six, situated in the body. Therefore, the practice of wearing bindi has been quite prevalent across the Indian peninsula. ⁽⁷⁾

An iodine patch, designed like a regular bindi, is expected to help one lakh tribal women in north-west Maharashtra battle iodine deficiency. Since these tribals don't consume iodized salt, they are usually deficiency in this nutrient. ⁽⁸⁾

It seems like a brilliantly simple idea. Indian women with iodine deficiencies could be spared severe medical conditions, says an advertising agency, if they use a special version of an everyday beauty accessory: the Jeevan Bindi or the Life-Saving Dot. The firm says it has handed out packets of iodine-coated bindis to women in rural areas, which will provide users with their daily dose of the essential element through the skin on their foreheads. ⁽⁹⁾

Created by Grey For Good, the philanthropic arm of the Grey Group Singapore communications firm, in partnership with the Neelvasant Medical Foundation and Research Centre and Talwar Bindi manufacturers, the patches slowly release the recommended amount of iodine over the course the day, while fitting seamlessly into the daily routines of millions of Indian women who already affix bindis to their foreheads on a regular basis. Grey Group Singapore release, the bindis have already been put into circulation at medical camps in a number of rural villages across India. What's more, according to CEO Ali Shabaz, "This program can easily be extended to reach a larger population of women in India who need this vital mineral for a healthier life."⁽⁵⁾

FUNCTION OF JEEVAN BINDI

The Jeevan Bindi is supposed to function on the same principle as the iodine patch test, in which a solution of iodine is applied to an arm or abdomen. If the iodine disappears, the person who is undergoing the test may have an iodine deficiency, which is indicated by the fact that the solution was quickly absorbed by the skin. However, medical literature is also replete with references to how most of any iodine solution applied to the skin evaporates and less than 12% is actually absorbed by the body. If 150 micrograms had to be available in the thyroid gland and other tissues where iodine is processed, a far bigger dose may be required on the skin.

"The body will take up only what it requires but it has to go internally first," said Dr Chandrakant Pandav, professor and head of the Centre for Community Medicine at the All India Institute of Medical Sciences. "If I have 500 micrograms and my body needs only 150 micrograms, then rest will be excreted in urine"⁽¹⁰⁾

These iodine filled bindis give out the daily required dosage of iodine to the women, without an additional effort. When a woman wears this bindi on

the forehead, it delivers the daily required amount of 100-150 micro grams of iodine to the body by absorption through the skin. These bindis need to be worn every day for up to eight hours to be effective and it can be worn at night and even by pregnant women.

Production costs are minimal, Shabaz says, and are affordable at just two rupees per pack. (The rural Maharashtra women Grey for Good worked with earned an average of 20-30 rupees per day.) Plus, wearing the iodine-infused bindi requires no behavioral change.⁽¹¹⁾

CONCLUSION

Iodine deficiencies may cause severe medical conditions like goiter, hypothyroidism, pregnancy-related problems like mental retardation and problems with growth, hearing, and speech in children.

Incorporation of medicine into lifestyle habits and daily practice through novel approaches should be encouraged like Iodine Bindi in the management of other chronic diseases.

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