



RATIONALITY OF SWARNA PRASHAN IN PEDIATRIC PRACTICE

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Abstract

Swarna (Gold) is well acclaimed for its therapeutic efficacy in *Ayurveda* texts. Both internal and external use of *Swarna* (Gold) has been prescribed. As a cultural practice, *swarna prashan/lehan* is very popular in India. In this *samskara*, *swarna Bhasma* with herbs like *Vacha Churna* (*Acorus calamus*), *Brahmi* (*Bacopa Monnieri*) mixed with Honey and *ghee* is administered to the new born baby for enhancing immunity as well as for intellectual development. All ancient *Ayurvedic* texts and particularly *Kashyap samhita*, details of *swarna lehan* with its therapeutic utility is described. *Swarna Prashan* is done by various means including raw gold, *Swarna Bhasma* etc. Studies show that by classical *bhasmikaran* process as described in texts of *Ayurveda*, there is reduction in the particle size of gold to a dimension of about 56-57 nm. Analysis of various experimental studies shows that *Swarna Bhasma* possesses immunomodulatory, free radical scavenging activity, anti-stress activity and analgesic activity. Toxicity study shows that chronic administration of *Swarna Bhasma* is non-toxic as judged by various laboratory and histological parameters. However, scientific evidences regarding the safety and efficacy of *Swarna prashan* in pediatric practice is lacking and hence this practice should be avoided or used with utmost caution.

Key words: *Swarna*, *Bhasma*, *Ayurveda*, *Lehan*

INTRODUCTION

Gold has been always considered to possess potential therapeutic efficacy. The use of gold in medicinal preparation can be traced back for thousands of years and it has been mentioned in medical literature

since ancient times.¹ Gold is a transition metal and group 11 element of periodic table. This metal has an atomic number 79 and atomic mass 196.96655. The melting and boiling point of gold is 1104.43°C and 2807.0°C respectively. Its name originates from the old English word 'geolo' which means yellow. Gold is represented by symbol 'Au' in chemistry which is originated from the *Latin* word *aurum*. This metal is the least reactive chemical element known after noble gases.²

In *Ayurvedic* literature gold is used both externally and internally for therapeutic purposes. Externally *Swarna dharana* (wearing of gold ornaments) is considered pious and mainly use in *grahabadha*. Internally it is either in the form of rubbed gold (*Vidhrisya dhoute drishadi*), incinerated gold or *Swarna Bhasma*, *Swarna Lavana* (Described in *Rasatarangini*) or *swarna vark* (Mostly used in *Unani* system of medicine).³

Traditionally *Swarna Prashan* is done as cultural practice in India. Mainly after delivery raw gold is rubbed on a stone with the help of little amount of water and is administered along with honey and ghee. In some places, *Swarna Bhasma* is administered to newborn babies along with drugs like *Vacha Churna* (*Acorus calamus*), *Brahmi* (*Bacopa Monnieri*), *Madhu* (Honey) etc. It is the matter of curiosity to all that is there really any benefit of this cultural practice or just it is another mass euphoria. The research on the effects of internal administration of swarna is very less. Very few published papers are there which suggest the pharmacology of *Swarna Prashan*. Review of the papers depicting the efficacy of swarna is discussed in the present article.

METHODS

Classical texts of *Ayurveda* as well as PUBMED, MEDLINE database were used for the search of relevant literature and research papers. Papers published between Jan 1960 to Jan 2012 were only considered. The key words used for the search was '*Swarna Bhasma*', '*Ayurveda*' etc. In-vitro analysis, experimental trials as well as clinical studies were included in the review to search out the reported therapeutic potential of

Swarna Bhasma. Only research articles published in English language were considered. Papers in other languages were approved when there was an English abstract containing data essential for the study.

RESULTS AND DISCUSSION

Classical procedure of *Swarna Lehan*

The procedure to *Swarna Lehan*, is described in *Kashyap Samhita* in much detail. It is mentioned that, keeping face towards east, gold should be rubbed on a washed stone with a little quantity of water. Then it should be churned with Honey and *Ghrita* and should be given to the child for licking. *Kashyapa* opines that feeding of gold increases intellect, digestive and metabolic power, strength, gives long life; is auspicious, virtuous, aphrodisiac, increases complexion and eliminates the evil effects of grahas. Further it has been mentioned that by feeding the gold for one month, the child becomes extremely intelligent and is not attacked by the diseases and by using for six months, is able to retain what-so-ever he/she hears. *Sushruta* and *Vagbhat* have prescribed gold along with various drugs to the newborn child immediately after birth. *Sushruta* has advised its use after emesis of liquor-amnii, but before massage⁴ and bath while *Vagbhata* has indicated it after massage and bath but before emesis⁵ The drugs prescribed by *Vagbhat* is advised to be given through spoon made of gold.⁶ The basic concept of this gold licking is entirely different as it is used only once in *Jatakarma Samskara* performed just after birth. *Sushruta*⁷ and *Vagbhat* have further prescribed four gold preparations for prolonged use.⁸

Utility of *Swarna Bhasmikaran* process

Swarna (Gold) is one of the most non-reactive metals known to mankind till date. In this context for making the *Swarna* therapeutically useful, there are mainly two requisites. First is reduction in particle size of the element. Unless the particle size is not reduced, it will not be absorbed or metabolized and will not impart any of the mentioned therapeutic effects. The second most important criteria is existence of metal in human body in ionic form. Non reactive substances will not impart any effect and will lie inert.

Swarna bhasmikaran is an ancient concept of reduction of the particle size of gold and making it a little reactive, so as to enable its pharmacological properties. Recently *Bhasmas* are considered to be biologically produced nanoparticles. As per the classical reference in ancient text of *Ayurveda*, *Swarna Bhasma* is prepared by *Putapaka* method. This method involves mainly three steps i.e. *Shodhan* (Purification of gold to haul out physical impurities), *Bhavna* (wet grinding for reduction of particle size) and *Maran* (incineration for further reduction in particle size under temperature). These procedures of *Bhavna* and *Maran* are repeated several times on the metal as the classical references.⁹ The incinerated matter is then well grinded and a brownish red powder i.e. *Swarna Bhasma* is obtained.

Now question arises, whether these ancient procedures really have any impact on the metal. In this context, *Brown et al (2007)* in their study evaluated the physico-chemical characterization of *Swarna Bhasma* by using atomic absorption spectrometer, FT infrared spectroscopy, transmission electron microscopy, Atomic force microscopy and x-ray diffraction analysis. Atomic absorption spectroscopy revealed that *Swarna Bhasma* contain 92 % gold. Cold vapor method of atomic absorption spectroscopy demonstrated absence of mercury which can be considered as a marker for proper incineration. No organic compounds were found through infrared spectrum of *Swarna Bhasma*. Same study has shown *Swarna Bhasma* principally constituted to globular gold particle of 56-57 nm. These results implicate that, particle size of gold in *Swarna Bhasma* is in nanometer dimension.¹⁰ In a recent investigation, instrumental neutron activation analysis and electron microscopy was used to study the gastrointestinal uptake and subsequent distribution of 4, 10, 28 and 58 nm diameter metallic colloidal gold particles following oral administration to mice. Studies show that particle uptake occurred in small intestine by persorption through single degrading enterocytes in the process of being extruded from a villus. *Swarna Bhasma* principally constituted globular gold particle of 56-57 nm and thus it is possible that these particles would reach the target site of action through blood after gastrointestinal uptake.¹¹

Review of pharmacological effects of Swarna Bhasma

The research on the effect of internal administration of *Swarna* in form of *Bhasma* is really very scanty. Very few published papers are there which suggest the pharmacological activities of *Swarna Lehan*. Reviews of the papers depicting the efficacy of *Swarna Bhasma* are as follows:-

Immunomodulatory activity

In *Kashyap samhita*, while describing the benefits of *Swarna Lehan*, *Acharya Kashyap* opines that, by feeding the gold for one month, the child is not attacked by any disease. This classical description implicates that ingestion of *Swarna* modulates immune mechanism, so that morbidity is reduced. Now, it is matter of debate regarding the scope of *Swarna Bhasma* in modulating the immune mechanisms of the newborn, so that, the child will not get any sort of disease. Research papers on the effect of *Swarna Bhasma* on immunity are very few. In an experimental study, *Bajaj et al (2001)* evaluated the efficacy of *Swarna Bhasma* on non-specific immunity in mice. Male mice were administered with the incremental doses of *Swarna Bhasma* orally for 10 days. It was observed that, *Swarna Bhasma* significantly ($p < 0.001$) increased counts of peritoneal macrophages and stimulated phagocytic index of macrophages. This demonstrates the immunostimulant activity of traditional *Ayurvedic* formulation '*swarna Bhasma*' on Macrophage functions.¹² Studies on the effects of *Swarna Bhasma* on specific immunity are not available. However, a gold formulation, *Kustha tila kalan* used in *Unani-tibb* was evaluated for immunomodulatory activity in male mice and parameters were used to evaluate the effect on cell mediated as well as humoral immunity. *Kustha Tila Kalan* was orally administered to animals at dosage of 6.25, 12.5, 25 and 50 mg/kg body weight for 10 days. Cell mediated immunity was assessed by measuring delayed type of hypersensitivity response while humoral immunity was evaluated using plaque forming cell assay. *Kustha Tila Kalan* augmented both the immune responses at dose level of 6.25, 12.5 and 25 mg/kg. The optimum activities were recorded at a dose of 25 mg/kg.¹³

Free radical scavenging activity

Mitra et al (2002) evaluated the free-radical scavenging activity of *Swarna Bhasma* using experimental animal model. It was observed that chronic *Swarna Bhasma* treated animals showed significantly increased superoxide dismutase and catalase activity. These two enzymes reduce free radical concentration in the body.¹⁴ Antioxidant/restorative effects of *Swarna Bhasma* against global and focal models of ischemia (stroke) is also reported.

While describing the indications of *Lehan karma* in pediatric population, *Acharya Kashyap* explains that, babies born to *Dushprajata* mothers should be administered with *Lehan (Swarna Lehan)*. *Dushprajata* literally means women with bad obstetrical history or difficult labor. This term broadly includes to all mothers who present with prolonged labor, either delivering prematurely or post term, abnormal presentation, along with associated complications like preeclampsia, etc. In short, all conditions which are not normal in an obstetric case can be considered as *Dushprajata*.

Now, it is a matter of logical reasoning that why ancient scholars mentioned to give *Lehan* to babies born to these *dushprajata* mothers. Now days, with medical knowledge ever expanding and developing, in order to reduce morbidity and mortality, scheduled caesarean section is performed on these *dushprajata* mothers. It is a matter of interest to investigate regarding differences between babies born to normal mother and *dushprajata* mothers.

A very recent study evaluated the effects of the mode of delivery on oxidative antioxidative balance of mothers and infants. It was observed that both the mothers and neonates in scheduled caesarean section group were exposed to higher oxidative stress as compared to those in normal spontaneous vaginal deliveries patient group. It was further reported that the antioxidant mechanisms in babies are insufficient to cope with this stress during caesarean section.¹⁵

Another group of indication of Lehan or *Swarna Lehan* as prescribed in classical text is *Ashira Janani*, *Alpakshira*, and *Dusta Kshira Janani*. *Akshira janani* refers to those mothers who don't breastfed their infants or mother with complete lactation failure. Human milk has potent antioxidative properties. It is observed that breast fed babies have lower oxidative stress intensity and have higher anti-oxidative capacity in the blood as compared to formula fed children.¹⁶ This indicates that, babies who are not being breastfed are prone to free radical induced damage.

Oxidative stresses have been implicated as cause of many abnormalities in newborn. *Swarna Bhasma* has been found to possess anti-oxidative properties and its administration may reduce free radical induced damage in neonates. However, more research is required to validate *Swarna Prashan* conclusively.

Analgesic activity

In an experimental study, *Swarna Bhasma* was investigated for analgesic effects in rats and mice using four types of noxious stimuli. It was observed that, the test drugs *Swarna Bahasma* at a dose of 25-50 mg/kg, p.o exhibited analgesic activity against chemical (acetic acid induced writhing), electrical (Pododolorimeter), Thermal (eddy's hot plate and analgesiometer) and mechanical test.¹⁷

Antistress effect

Shah et al (2005) investigated the therapeutic potential of *Swarna Bhasma* in restraint induced stress at different time points of 01 hour, 02 hours and 04 hours using experimental rat model. Rats were pretreated with *Swarna Bhasma* in a dose of 25 mg/kg orally for 10 days prior to restraint stress. Brain catecholamine, serotonin and plasma corticosterone levels were determined following 01, 02 and 04 hours restraint stress, using HPLC and also plasma corticosterone using luminescence spectrophotometry. It was observed that *Swarna bhasma* restored restraint stress induced elevation in levels of brain catecholamines (norepinephrine, epinephrine and dopamine), 5 HT and plasma corticosterone to near normal levels.¹⁸

Toxicity studies

In an experimental model, it was observed that, acute oral administration of *Swarna Bhasma* showed no mortality in mice (upto 1 ml/20 g body weight of *Swarna Bhasma* suspension containing 01 mg of drug). Moreover, chronic administration of *Swarna Bhasma* also showed no toxicity as judged by SGOT, SGPT, serum creatinine and serum urea level and histological studies.¹⁹

CONCLUSION

Use of *Swarna* (Gold) as therapeutic agent has a very long history. In Ayurveda, *swarna* (Gold) is advocated in form internal and external medication for treatment of various ailments. As a internal medication, *swarna* (Gold) is mainly used in form of *Bhasma* (Incinerated form). *Swarna Prashan/Swarna Lehan* as a cultural practice is very popular in India. The process of *swarna prashan/Lehan* is described in detail in *Ayurveda*. Studies show that, classical *bhasmikaran* process as described in ancient *Ayurvedic* texts reduces the particle size of gold particle in a range of nanometers. Pharmacological review of *Swarna Bhasma* reveals that it possesses immunomodulatory, free radical scavenging activity, analgesic activity and antistress activity. However there are insufficient scientific evidence to suggest the efficacy and safety of *Swarna Prashan/ swarna lehan* in pediatric population. In this context, more research studies are anticipated to ensure the safety and efficacy of this traditional cultural practice.

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