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EFFECT OF SWARNAPRASHANA ON CHILD HEALTH: A REVIEW

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ABSTRACT: Introduction: Gold preparations are highly prized and often utilized for their tonic and revitalizing effects in Indian systems of medicine. Gold has both preventive and curative medicinal properties. The Kashyap Samhita, under the name *Swarnaprashana*, describes the usage of gold internally in children *via* the oral route. After birth, it is indicated in *Lehan karma* (supplementary feeding to improve nutrition, immunity and intelligence) and *Jatkarma* (newborn care). Now a day *Swarnaprashana* in children is getting huge publicity, and many trials are being conducted to evidence its use in children. **Material and Methods:** This review is in a narrative format and consists of all publications relevant to *Swarnaprashana* or *Suvarnabinduprashana*, *Suvarnabindu prashan*, *Suvarnavachayog*, or *Swarnavachayog* that the authors identified through a systematic search of major computerized medical databases; no statistical pooling of results or evaluation of the quality of the studies was performed due to the widely different methods employed by each study. **Result and Discussion:** The present review of the studies proves the role of *Swarnaprashana* in enhancing cognition and protection against diseases by enhancing immunity. *Swarnaprashana* acts on multiple levels and can be given for better growth and development in children. *Swarnaprashana* is safe for children. **Conclusion:** Clinical and pharmacological studies show immunomodulatory, nootropic, and therapeutic effects of *Swarnaprashan* as therapy.

INTRODUCTION: Gold preparations are highly prized and often utilized for their tonic and revitalizing effects in Indian systems of medicine. Gold has both preventive and curative medicinal properties. In various forms, administration of *Swarnabhasma* has been indicated in Ayurveda in infants and children.

Gold is utilized in the Ayurveda system of medicine in the form of refined metallic fine powder (perhaps as nanoparticles) or red colloidal solution, both of which are made through a complex process that includes the use of herbal extracts and even other metals¹.

The Kashyap Samhita, under the name *Swarnaprashana*, describes the usage of gold internally in children *via* the oral route. The benefits of *Swarnaprashana* are categorized into three categories: intelligence, immunity, and nutrition. Furthermore, it has been stated that by administering *Swarnaprashana* for one month, the child becomes *Param Medhavi* (Incredibly

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intelligent) and *Vyadhi Bhishch Na Ghrishyate* (Disease-free), by administering *Swarnaprashana* for six months, the child becomes *Shrutdhara* (May recall anything he or she hears)². After birth, it is indicated in *Lehan karma*³ (Supplementary feeding to improve the nutrition, immunity, and intelligence) and *Jatkarma*⁴ (Newborn care). As the child grows, gold is indicated to get *Agni* (Digestive powers), *Bala* (Strength and immunity), *Medha* (Intellectual power), *Varna* (Complexion), and *Ayu* (Life span)⁵. When *Arishta Lakshana* (Fatal signs) is observed on the deathbed, gold is administered for therapeutic action⁶. Thus, gold is a noble metal used from conception until death. According to Ayurveda texts, gold should be used after adequate purification because incorrectly purified gold can deplete strength and induce diseases and even death⁷. Acharya Sushruta mentioned the administration of *Swarna* (gold) along with honey and Ghee in one of the procedures of *Jatakarma Sanskara* (Birth ritual)⁸. The medicine is used as a single dose at the time of birth in the procedure of newborn care. Acharya Vagbhatta⁹ and other Acharyas also mention *Swarnaprashana* (Gold licking) immediately after the birth as a part of *Jatkarma Sanskara* (Birth ritual). Rather than focusing on the sickness, the

ancient Ayurvedic Acharya emphasized the development of the body's defensive mechanism against disease. Regarding pediatric situations, Acharya took extra precautions to enhance the infant's immune system from the moment he was born. It is one of the oldest applications of gold nanomedicine. Clinical and pharmacological studies show immunomodulatory, nootropics and therapeutic effects of *Swarnaprashana* as therapy.

Aims and Objectives: To review the use of *Swarnabhasma* in children and the safety and efficacy of *Swarnabhasma* in children.

MATERIAL AND METHODS: This review is in a narrative format and consists of all publications relevant to *Swarnaprashana* or *Swarnabindu prashana*, *Suvarnabindu prashan*, *Suvarnavachayog* or *Swarnavachayog* that the authors identified through a systematic search of major computerized medical databases; no statistical pooling of results or evaluation of the quality of the studies was performed due to the widely different methods employed by each study.

Pharmacological Properties of Swarnabhasma: Pharmacological Properties of SwarnaBhasma.

TABLE 1: THERAPEUTIC EFFECT OF GOLD (SWARNABHASMA) AS DESCRIBED IN AYURVEDA CLASSICS

S. no.	Name of book	Indications*
1.	KashyapaSamhita ¹⁰	<i>Medhavardhan</i> (Intellect Promoting), <i>Agni Vardhan</i> (Digestive), <i>BalaVardhan</i> (Strength Promoting), <i>Ayushyam</i> (Improvement In Life Expectancy), <i>Mangal-Punya</i> (Auspicious), <i>Vrishya</i> (Aphrodisiac), <i>Varnaya</i> (Improvement In Complexion And Skin Texture), <i>Grahapaham</i> (Protection From Evil Spirits And Microorganisms), <i>Shrutdhara</i> (Capable Of Grasping Even On Listening)
2.	SushrutSamhita ¹¹	<i>Vapu</i> (Build), <i>Medhavardhan</i> (Intellect Promoting), <i>Balavardhan</i> (Strength Promoting), <i>Buddhivardhan</i> (Cognitive Effect)
3.	CharakSamhita ¹²	<i>Punsavan karma</i> (Sacrament)
4.	Astang Sangrah ¹³	<i>Medha</i> (Intelligence), <i>Ayu</i> (Life Promoting), <i>Arogya</i> (Health promoting), <i>Kanti</i> (Complexion promoting), <i>Saubhgya</i> (Luck), <i>Pushti</i> (Strength Promoting)
5.	AstangHaridya ¹⁴	<i>Vapu</i> (Build), <i>Medha</i> (Intelligence), <i>Balavardhan</i> (Strength Promoting), <i>Varnakara</i> (Complexion Promoting)
6.	Bhavaprakash ¹⁵	<i>Brahanan</i> (Weight promoting), <i>Netrayam</i> (Improve vision), <i>Medha</i> (Intelligence), <i>Smriti</i> (Memory enhancer), <i>Buddhivardhak</i> (Cognitive effect), <i>Hridya</i> (Cardiac tonic), <i>Ayushkar</i> (Improvement in Life Expectancy) <i>Kaanti</i> (Complexion promoting), <i>Vaakshuddhikar</i> (Improvement in Speech Disorder), <i>Tridosahar</i>
7.	Bhaishajya Ratnavali ¹⁶	<i>Varna-Kantivardhak</i> (Improvement in Complexion And Skin texture), <i>Ayu</i> (Life promoting)
8.	Ras Ratna Samuchya ¹⁷	<i>Kshyhar</i> (Improvement in debility), <i>Agnimandyahar</i> (digestive), <i>Shwasahar</i> (Effect on Asthma), <i>Kasahar</i> (Effect on cough), <i>Aruchi</i> (Anorexia), <i>Sangrahnihar</i> (Malabsorption Syndrome), <i>Ojodhatuvivardhana</i> (Immunomodulatory), <i>Balakar</i> (Strength promoting), <i>PanduRogahar</i> (Effect on Anemia), <i>SarvaVishahar</i> (Detoxifying toxins -Antidote)
9.	Rasa Prakash Sudhakar ¹⁸	<i>SaundaryaKantivardhana</i> (Beauty promoting, Improvement in Complexion and Skin texture), <i>TridoshajaRoga</i> , <i>Vishanashaka</i> (Detoxifying toxins -Antidote)
10.	Rasa Tarangini ¹⁹	<i>Vrishya</i> (Aphrodisiac), <i>Hridya</i> (Cardiac tonic), <i>Netrya</i> (Improve Vision), <i>Smritiprada</i>

11	AFI ²⁰	(Memory enhancer), Medhya (Intellect promoting), Punsavanopyogi (Sacrament), Vishahar (Detoxifying toxins -Antidote) <i>Grahani</i> (Malabsorption Syndrome), <i>Amlapitta</i> (Dyspepsia/Acidity), <i>Hikka</i> (Hiccup), <i>Pandu</i> (Anemia), <i>Shwasa</i> (Dyspnoea/Asthma), <i>Jwara</i> (Fever), <i>Dhatu Kshaya</i> (Tissue wasting), <i>Rajayakshma</i> (Tuberculosis), <i>Buddhikshaya</i> (Impaired Intelligence), <i>Apasmara</i> (Epilepsy), <i>Snayudaurbalya</i> (Rupture Of Ligaments), <i>Hridroga</i> (Heart Disease), <i>Vataroga</i> (Disease due to Vata Dosha), <i>SharirVarnahani</i> (Change in Body Complexion), <i>Phiranga</i> (Syphilis), <i>Visha</i> (Poison), <i>Smritihani</i> (Loss of Memory), <i>Unmada</i> (Mania/Psychosis), <i>Svarabheda</i> (Hoarseness of Voice), <i>Kushtha</i> (Skin Disease), <i>Jara</i> (Senility/Progeriasis), Used as <i>Rasayana</i> , <i>Vajikara</i> , <i>Medhya</i> , <i>Smritivardhaka</i> (Nutrient to Body and Mind with Adapto-Immuno-Neuro-Endocrino-Modulator Properties, Aphrodisiac, Brain Tonic/Nootropic, Improves memory)
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Pharmacological Actions:

Immunomodulatory Effect of *Swarnaprashana*:

Research was carried out to study the immunomodulatory activity of *Swarnaprashana* in albino rats where both the test drug and vehicle were administered for 10 days. The study revealed that there was a significant increase in platelet count compared with SRBC (humoral immunity) group in the test drug group, whereas a non-significant increase in paw edema (cell-mediated immunity) after 24 hours and after 48 hours compared to the control group. Histopathological studies revealed that *Swarnaprashana* increased the cellularity in the spleen and lymph node, indicating that *Swarnaprashana* produces humoral immune response²¹.

The effects of the Ayurvedic gold preparation *SwarnaBhasma* (SB) - auranofin (AN) and the Unani preparation *KushtaTilaKalan* (KTK) on non-specific immunity were investigated in a study where the incremental doses of these medicines were given orally to male mice for ten days. Both test medications (KTK and SB) significantly ($P < 0.001$) raised peritoneal macrophage numbers and enhanced macrophage phagocytic index, whereas AN had a suppressive effect on these parameters²².

The study described the possible mechanism of *Swarna Bindu Prashana* (SBP) in dendritic cell maturation and subsequent T cell activation. The study concluded that SBP is an immune booster for newborns against any viral disease, and comprehensive scientific research is needed to confirm its safety and efficacy²³.

In a study, the effect of *Swarnaprashana* and *Swarna-vacha-prashana* on anthropometry, biochemical, immunological, hematological and

infant toddler quality of life (ITQOL) parameters were assessed in newborns in 3 groups as Group A- *Ghrita and Madhu*, Group B-*SwarnaBhasma, Ghrita and Madhu* and Group C: *SwarnaBhasma, Ghrita, Madhu and Vacha Churna*. In this trial, all three groups demonstrated a statistically significant ($P < 0.001$) increase in all anthropometrical metrics, no influence on the infant's normal growth, no significant differences in hematological and biochemical markers in the groups as well as no significant difference in Immunological indicators with the exception of Group C, which had higher levels of immunoglobulin G (IgG), IgM, albumin, globulin & all ITQOL metrics. This also proved the safety of the drugs in newborns²⁴.

Swarna Bhasma mixed with *Ghrita* and *Madhu* (*Suvarna BinduPrashana*) were given in 12 healthy children 4 drops of *Swarna Bhasma* suspended *Ghrita* (4 mg gold/dose) followed by four drops of honey once every month for 6 months. The study showed an increase in mean levels of immunoglobulins (IgG, IgM, IgA) after 6 months significant reduction in duration, severity, and frequency of illness²⁵.

In one clinical study, *Suvarna Vacha* was found to have immunomodulatory effects in neonates without causing toxicity; however, more research on standardization of the technique and therapy and toxicity studies on appropriate animal models are needed to establish the therapy's safety and efficacy²⁶.

In a case study of a 1 year and 05 months old female child with complaints of recurrent common cold and cough since birth, *Swarna prashan* maintained general health of the body and decreased recurrent common cold and cough in the child. The result indicates that *Swarnaprashan* is

assumed to possess an immunomodulatory function²⁷. A randomized, controlled, single-blind study was conducted to assess the safety and efficacy of *Swarna Bhasma* (calcined powder), *Madhu* (honey) and *Ghrita* in infants concerning anthropometrical, hematological and immunological parameters. 102 healthy infants were allocated into trial and control groups.

The trial group received a mixture of *Swarna Bhasma*, honey and *Ghrita*, while the control group received a mixture of honey and *Ghrita*, both in drop form, for a period of 4 weeks with 8 weeks follow-up. Safety was assessed based on biochemical parameters, and efficacy was based on the values of IgG before and after the treatment. Anthropometrical and biochemical parameters did not show any statistically significant difference between the effect of trial and control drugs, which suggested that the trial drugs did not hamper the normal growth of the infants and were safe to be administered in infants. Both trial and control drugs showed statistically significant changes in IgG levels individually before and after the treatment; however, when compared between the groups, there were no significant differences.

However, the number needed to treat (NNT) to assess the normalization of immunoglobulins, which is suggestive of its immunomodulatory activity, was 1 out of every 4.535 infants who received *Swarnarashana* was significant. As evident by NNT, it showed immunomodulatory activity and was tolerated by the infants with no adverse effects during the trial or follow-up period²⁸. A randomized, open-label study was conducted on 60 children of 06 months to 5 years of age and was randomly divided into two groups (30 in each).

Effect on Growth, Development and Behavior:

In Ayurveda *Swarnaprashana* (SP) is stated to be effective in increasing intelligence, strength and potency to longevity. A study investigated the effect of SP on physical growth parameter weight and height. Total 120 children were selected randomly from outpatient department (OPD) with age group ranging from 0 to 12 years. SP as trial drug and *Madhujala* as placebo was administered in children of trial group and control group, respectively, for 14 times in the duration of 1 year (on every *Pushyanakshatra* days). Growth

parameter weight and height was assessed on every visit of children. It is found that SP has significant ($p < 0.05$) effect on height in male and female children as compared with standard group³⁰.

Nootropic Activity: A study, aimed to prepare and evaluate the traditional formulation, *Swarnaprashana* for its nootropic efficacy on the learning and memory by employing exteroceptive and interoceptive behavioral models in young and aged mice. *Swarnaprashana* (30 mg/kg, p.o.) was administered to young and aged Swiss albino mice for 15 days. The elevated plus-maze and Morris water maze were used as exteroceptive behavior models. *Swarnaprashana* was prepared by mixing *Swarnabhasma* (gold) with honey and Ghee was used as vehicle. Scopolamine and naturally ageing-induced amnesic models were used as interoceptive behavior models.

Biochemical parameter such as whole brain acetylcholinesterase (AChE) activity is used to quantify the nootropic activity. Piracetam (200 mg/kg, p.o.) was used as a standard nootropic agent. The pretreatment of *Swarnaprashana* (30 mg/kg, p.o.) exhibited significant improvement in learning and memory ($P < 0.01$) and also showed significant ($P < 0.001$) decrease in whole brain AChE activity and hence, it can be employed in enhancing the memory of the child³¹. The efficacy of the formulation *SuvarnaBinduPrashan* in twenty apparently healthy male and female In Group A, trial drug (*Swarnaprashan*) was given, and in Group B, there was regarded as 'No concurrent treatment control'. In group A where trial drug (*Swarnaprashan*) was given, improvement in morbidity features were found whereas in group B which was 'No treatment concurrent control', 'not significant' results were obtained. Present research reveals that *Swarnaprashan* works as an immune-modulator which decreased the morbidity rate and therefore can be a simple remedy to bring down the morbidity rate in children. Post-treatment follow-up showed sustained effect of the trial drug²⁹.

children aged 3 to 4 years was studied. Subjects in Group A received *SuvarnaBinduPrashan* (*Suvarna Bhasma*, *Ghrita* and *Madhu*) whereas Group B (Control group) did not receive any treatment. Both the groups were observed for six months. Children in *SuvarnaBinduPrashan* group showed significant

reduction in the scores of eating habits, behavior, mood, temperament and scores of events of illness. However, there was no significant difference in the score of sleeping habit. There was significant increase in IQ percentage³². Administration of gold in children is a popular practice in Ayurveda. It is stated that pure gold if administered along with honey and Ghee for a period of 6 months will enable the infant to remember things which are just heard. Study was conducted to evaluate the effect of *SwarnaBhasma* on memory and learning against hyoscine/ scopolamine induced amnesia in albino mice. Young Swiss albino mice of either sex divided into three groups. The trial drug contained *SwarnaBhasma*, honey and Ghee whereas adjuvant drug contained only Ghee and honey which were made into drops from and directly administered in 2 groups of mice and the other group was kept as the normal control. Elevated plus maze was used to assess the effect of test drugs on transfer latency which is interpreted as effect on learning and memory. The trial drug showed significant decrease in transfer latency ($p < 0.05$) both on 2nd and 3rd day of the study when compared with initial values and the control group. *SwarnaBhasma* exhibited significant therapeutic effects on memory and learning in albino mice³³.

Effect on Nocturnal Enuresis: 40 patients of *Shayyamutra* (Nocturnal enuresis) satisfying diagnostic criteria and age 6-16 years were selected. Among them, 20 patients were treated with *Swarnamritaprashana* capsule daily once for two months along with *Satvavajaya Chikitsa* in study group. The other 20 patients were treated with *Ghritabharjita Godhuma* capsule (placebo) daily once for two months along with *Satvavajaya Chikitsa* in control group. The patients were assessed on the completion first month, second month and followed again after third month. It was open labeled standard control non-randomized prospective clinical trial from August 2016 to Feb 2017. Statistically significant effect ($p < 0.05$) of *Swarnamritaprashana* capsule along with *Satvavajaya Chikitsa* in reduction of all signs and symptoms of nocturnal enuresis after treatment were observed³⁴.

Safety of Swarnaprashana: The safety parameters of *Swarna Bindu Prashan* (SBP) and its vehicle's effect on chronic administration were investigated.

The groups of Wistar strain male albino rats were identified as control, vehicle group of Ghee, honey and both ghee-honey and group of SBP, respectively. In the SBP group, *Swarna Bhasma* was administered at a dose of 5.625 mg/ kg body wt. along with 0.4 mL of each Ghee and honey. The vehicles group also received the same dose of 0.4 mL/kg of each substance in graded quantities by oral route for 90 days. No mortality, as well as no significant behavioral changes, was noticed in any group studied during the study. The effect on food and water consumption and fecal and urine output remained unaffected. No major alterations were observed in hematology and serum biochemistry. Histopathology of vital organs also supported the non-toxic effect of SBP. It is concluded that the chronic use of SBP is safe and non-toxic at this tested dose level compared to other vehicle groups³⁵.

DISCUSSION: Infancy or childhood is the growing period of life and is the most crucial period. Proper growth, psychosocial development, and a disease-free state of health in this period provide a strong foundation to the future building of life. Ayurveda science is more concerned with a better life by preventive and promotive measures for pediatric age group.

Kashyap stated that the health and illness of a child depend on the *Lehana*³⁶. *Lehana* is an ancient process of administering *Swarna* and other useful medicines through oral route in children for better health and prevention of many diseases. Acharyas have mentioned four *Swarnayogas* (formulations) for the proper growth and development of child. In all the four *Yogas Swarnabhasma* (gold), Ghee and honey are present³⁷. As *Swarna* is the main ingredient of this *Lehana*, it is named *Swarnaprashana*³⁸. Acharyas have mentioned the benefits of *Swarnaprashana*. They have stated that regular use of *Swarnaprashana* helps to sharpen the memory to its extreme level, helps in proper growth and development, and prevents diseases³⁹. *Swarnaprashana* also improves digestion and metabolism, which keeps the *Tridoshas* in a balanced state. Thus the child remains free from seasonal variances and helps in effective growth. The present review reveals that *Swarnaprashana* increases the body's immunity level and thereby may help in proper growth and development.

Modern research shows that gold particles have anti-oxidant properties and T-lymphocyte activation and thus regulate antigen-specific immune response⁴⁰. The *Madhu-Ghrita-Swarna-Vacha* combination had a significant impact on humoral anti-body growth in neonates. It also showed an increase in total proteins and serum IgG levels, activating the immune system's response⁴¹. This effect of *Swarna* may decrease the frequency of illness in children and helps to grow healthily. It also shows cognitive effects, which may increase *Dhi* (intellect), *Dhriti* (restrain) and *Smriti* (memory or recalling capacity)⁴²⁻⁴⁴. In a study, colloidal gold was found to improve cognitive performance, measured by IQ scores of⁴⁵. The study also reported the free radical scavenging effect of *Swarnabhasma*⁴⁶ which justifies its use as *Jatakarma* at the time of birth. During birth, there may be oxidative damage to the newborn, which the administration of *Swarnaprashana* may correct. Honey and ghee act as a vehicle for the *Swarnaprashana*⁴⁷. A toxicity study provides evidence of the safety of *Swarnaprashana*⁴⁸.

CONCLUSION: The present review of the studies proves the role of *Swarnaprashana* in enhancing cognition and protection against diseases by enhancing immunity. *Swarnaprashana* acts on multiple levels and can be given to for better growth and development and protection from diseases by improving immunity and during brain growth for proper brain growth and improving cognition. *Swarnaprashana* is safe for children.

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