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Role of *Swarnaprashan* in Children: A Systematic Review

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ABSTRACT:

Background: *Swarnaprashan* is a herbo-mineral Ayurveda preparation recommended in pediatric age group to enhance immunity and intellect since antiquity. Numbers of advocates are available for the practice of *Swarnaprashan* and its utility.

Aim & Objective: The current review is aimed to assess the role of *Swarnaprashan* in children which could potentially have multifaceted benefits.

Material and Method: A systematic review was conducted following PRISM ScR guidelines. Randomized Controlled Trials (RCTs) analyzing the role of *Swarnaprashan* in children and published articles between 2001 to 2022 year were included in this study. Electronic databases were screened viz. PubMed, Medline, Google Scholar, Scopus. The following keywords were used: "*Swarnabinduprashan, Suvarnabinduprashan, Suvarnaprashan, and Swarnaprashana*. To obtain additional data a manual search was performed using the reference lists of included articles.

Results: Present systematic review reveals the beneficial health effects of *Swarnaprashan*: a) Immunomodulatory effect b) Effect on ITQOL c) Effect on hematological biochemical parameters/ Assessment of safety d) Effect on cognition e) Effect on growth, development and behavior.

Conclusion: Present systematic review proves the role of *Swarnaprashana* in enhancing the cognition, physical growth, development as well as protection against the diseases by enhancing the immunity. There for *Swarnaprashan* could serve as drug of multimodal action at various levels which could lead complete development of a child.

Keywords: *Swarnaprashan*, Immunity, Ayurveda, Children.

INTRODUCTION

Swarnaprashan is a herbo-mineral Ayurveda preparation recommended in pediatric age group to enhance immunity and intellect since antiquity. Numbers of advocates are available for the practice of *Swarnaprashan* and its utility.

Swarnaprashan is a combination of two words – "*Swarna*" and "*Prashana*". *Swarna* refers to the noble metal Gold (Au). *Prashana* is act of eating/consuming/ingesting. *Swarnaprashan*, also known as *Swarna Bindu Prashana* or

Swarnamritaprashan, is the act of swallowing or ingesting gold in the required amount and quantity in the recommended way. Raw gold is smeared on a stone with water while reciting sacred *Mantras* and offered to a newborn with honey and *Ghrita* shortly after birth (*Jaatmatra*).[1] *Swarnaprashan* enhances *Medha* (Intelligence), *Agni* (digestive power), *Bala* (strength), and *Ayu* (age). It is *Varnya* (complexion), *Pavitra* (pious), *Mangalkaraka* (good will) and *Vrishya* (aphrodisiac). If administered everyday for a month, the child becomes *Medhavi* (clever), and if given for six months, the child becomes *Shrutadhara* (remember everything which is heard). According to Acharya Kashyapa, ingesting the gold to child for one month protects the children from diseases. According to this conventional concept, *Swarna* consumption modifies immunological mechanisms, reducing morbidity. *Swarna bhasma* has immunomodulatory, free radical scavenging, analgesic and anti-stress effect. *In vitro*, *in vivo* and Clinical Studies done on *Swarnaprashan*/*Swarna Bindu Prashan* have suggested that it has a good immunomodulation, growth promoter, anti-tussive, nootropic and may support quality of life in cancer patients during anti-cancer treatment but very little evidences are available on *Swarnaprashan*. Hence, further research is needed in this area. Therefore, a scoping review on available evidences on *Swarnaprashan* and its health outcomes in children was done to identify knowledge gaps and pave way for future research and systematic reviews.

AIMS & OBJECTIVE

The current review is aimed to assess the role of *Swarnaprashan* in children which could potentially have multifaceted benefits.

MATERIALS AND METHODS

The Joanna Briggs Institutes methodology for conducting systematic scoping reviews and the PRISMA-ScR checklist for scoping reviews were followed.

a) Search Strategy

The comprehensive literature search was performed following PRISMA ScR guideline to carry out a systematic review study on the role of S*warnaprashan* in children. In PubMed google scholar, database the keywords used for search were "*Swarnabinduprashan"*,OR "*Suvarnabinduprashan"* OR "*Suvarnaprashana"* OR *"Swarnaprashana*" to search published literature and Randomized Controlled Trials RCT's between the year 2001 and 2022 on the role of *Swarnaprashan* in children. General searches in AYUSH Research Portal and in Google, were done to analyze the extent of unpublished or grey documentation in the context of *Swarnaprashan*.

b) Source of evidence screening and selection

The article obtained by electronic and manual search were scrutinized and duplicates removed. Then titles and abstracts were read for selecting relevant article following which full text reading of selected studies was done applying inclusion and exclusion criteria. After reading full text, only 05 studies were included and reviewed.

c) **Inclusion/exclusion criteria**

The study involved- 1. Human subjects aged less than 16 years, 2. Study design as RCTs 3. With a treatment arm involving *Swarnaprashan* formulation prepared using *Swarna bhasma*, honey and *Ghrita* as its basic ingredients. Exclusion criteria was In-vitro study, In Vivo Study, Toxicity Study, Review studies, Conceptual Studies, reports etc on the topic *Swarnaprashan*.

d) Data extraction

Data from the included studies were charted on performed table.

e) Analysis and presentation of results

The studies were analyzed for general characteristics, interventions and methodology, characteristics of participants and controls, and outcomes. A qualitative assessment of the methods, outcomes/intervention effects was done given as a narrative summary.

RESULTS

a) Search results

A total of 84 records were found in the database search viz. 80 from Google scholar and 4 from PubMed search. No additional researches were found through the AYUSH research portal. On elimination of duplicates, a total of 80 records were screened for eligibility. Out of 80, total of 73 records were excluded since they were not clinical trials and belonged to the varied categories such as in vitro study, toxicity study, in vivo study, case reports and some were non-relevant. A total of 7 articles that met the inclusion criteria were screened for eligibility by two authors. Post the screening process, a total 5 records were found meeting up the eligibility criteria and were finally selected for the current systematic review process.

b) Inclusion of sources of evidence

All the five studies selected used *Swarnaprashan* prepared from *Swarna bhasma* along with or without nootropic drugs as intervention among which there were all randomized controlled trials. All the studies reported one or the other of the following outcomes; changes in growth, development, disease characteristics, ITQOL, hematological, biochemical or immunological parameters. Each of the selected study is summarized below. (Diagram)

Summary of Records Selected:

1. In a study conducted by Rathia S. et.al, 2021,[11] out of 119 children registered, a total of 39 subjects received intervention in Group A i.e. *Madhu* and *Ghrita* in unequal quantity, 42 subjects in Group B received a *Swarna*, *Madhu*, *Ghrita* (Unequal quantity) whereas, 38 in Group C received *Swarna*, *Vacha*, *Madhu*, *Ghrita* (Unequal quantity). Dose of *Swarna bhasma* was fixed based on age of infants using fried's rule. *Swarnaprashan* drops were administered orally once day in the morning for 4 weeks. The follow-ups were taken on first completion of 4th week second on 8th week (post-treatment 4th week) and third post treatment follow up on 12th week (post treatment 8th week) in every patient. The clinical and anthropometric parameter response of the treatment of each case was observed and further the differences were analyzed using t test and one way ANOVA followed by Dunn's Method. The assessment of total effect of therapy was assessed by the improvement in infant toddler quality of life parameters (ITQOL) whereas changes in routine hematological investigations, biochemical parameters, Serum IgG and IgM were also monitored. The study reported highly significant improvement in anthropometry in all the three groups. Hematological and biological parameters did not show significant difference in comparison in all groups. Immunological parameters also did not show significant difference of comparison in all groups except in Group C IgG, IgM, Albumin, Globulin levels were increased. Group C show significant improvement in all the ITQOL parameters whereas no significant difference in improving physical abilities on comparison. Table 1,2
2. Participants in experimental group of Bhaskaran J et.al, study, 2019, received *Swarnaprashan* [Mixture of *Swarna bhasma* (processed gold, honey and *Ghrita*)] whereas Control group received control drug (mixture of honey and *Ghrita*) wherein the dosage of *Swarna bhasma* was fixed using the fried's rule. Subjects were assessed using primary outcome as the changes in the values of immunological profile tests and secondary outcome as the changes in anthropometry parameters to monitor changes in growth at 2 weeks in between till 8 weeks period. The results suggest that at the end of the study, 84.5% of the infants in the trial group and 60% of the infants in the control group showed normalization of IgG values. The study revealed no statistical differences between the trial (*Swarnaprashan*) and control groups (honey and *Ghrita*) on the anthropometry.[2]
3. In a study carried out by Rana A et.al, 2021, 60 children aged 3-5 years were categorized in two groups , first group received 4 drops of *Swarnamritaprashana*, equivalent to 2 mg of *Swarna bhasma* once in a month whereas another control group received no drug. *Swarnamritaprashana* was prepared using 4000 ml of *Kashaya* of *Guduchi* green stem and 1000 ml of ghee along with *Kalka* of *Brahmi*, *Vacha*, *Jatamamsi*, *Yashtimadhu*, *Ashvagandha*, *Shankpushpi*, *Pippali Choorna* (40 gm each) was heated at the time of administration, 1.2 gm of *Swarna bhasma* added to whole material, 50 ml of honey were added and triturated with 50 ml of material. Subjects were assessed for Subjective Parameters as Measures of morbidity (RTI, GITI) Parental feedback on general health of child whereas Objective Parameters • Anthropometry for height, weight, chest circumference, mid-arm circumference • Laboratory Parameters: Complete Blood Count • Immunoglobulin Test: IgG. The final assessment concluded that *Swarnamritaprashana* was effective in reducing the recurrent episodes of infection from 6.23 to 4.10 making the difference of 2.13 episodes in RTI and reducing the episodes from 1.033 to 0.63 making the difference of 0.403 episodes in GITI by the improvement in IgG levels shown in study group.[3]
4. In a study Uppinakuduru S. et.al, 2021, found that parameters were assessed before treatment and 30 days after completion of the treatment course (i.e. assessment done on the 0^{th} day and on the 60^{th} day) with primary parameters such as serum immunoglobulin G and salivary immunoglobulin A. which was evident by the changes seen in the levels of serum immunoglobulin G and salivary immunoglobulin A, though the changes observed in the levels of immunoglobulins were not statistically significant in the present study setup. *Swarnamritaprashana* was found to be better than placebo in the promotion of *Bala* (Strength) in children as reflected by improvements in parameters representing *Dehabala* (physical strength), *Manobala* (mental strength), and *Agnibala* (digestion power).[4]

5. Ramteke RD et.al, 2014, conducted a study on 120 participants where 60 subjects received intervention of trial drug *Swarnaprashana* whereas another 60 subjects received placebo control *Madhu Jala* on every *Pushyanakshatra* for 14 times in a year. Assessment of growth parameters that is height and weight was done. The results revealed that *Swarnaprashan* has significant ($p<0.05$) effect on height in male and female children in relation with standard group.[5]

DISCUSSION

Around five decades have passed, and a plethora of clinical studies have been done to create evidence-based data at various Ayurveda postgraduate institutions and research organizations. Despite the tireless efforts, it appears that a definitive list of pharmaceuticals that might be used to treat a certain disease or stage of that disease is still waiting. One cause for this might be a lack of adequate review of prior research and the execution of fresh clinical trials with different methodologies each time without taking into account the findings and flaws of earlier work. Conducting a new clinical study without taking into account the efforts and outcomes of previous work always adds to the amount of data available, but never helps to achieve a conclusion. As a result, systematic review must begin Ayurveda research as its integral part which might further assist us answering the queries where the outcome is unknown and explaining why there are differences of practice.[11] *Swarnaprashan* is a herbo-metallic formulation containing *Swarna bhasma* (gold nanoparticles), *Ghrita* and honey as its basic constituents. Varied Methods of preparation of *Swarnaprashan* were followed in all the studies. The present systematic review is aimed at collecting and analyzing information from the RCTs on the role of *Swarnaprashan* in children which was revealed in the 07 selected studies that show positive outcomes of *Swarnaprashan* on growth and development, ITQOL and immunity. The fewer number of available evidences displays the need for further research.

Effect of *Swarnaprashan* on Anthropometry:

The overall observation among these research trials was that *Swarnaprashan* produced significant results when compared to control group /placebo group in improving anthropometric parameters such as height and weight. However, one study Bhaskaran JK et.al, 2019 reported no significant difference in trial group and control group on anthropometry. This suggests that *Swarnaprashan* can be given to enhance the physical growth and development in children and also to improve the general health.

Effect on the Immunity:

Four out of these 5 RCTs assessed the effect of *Swarnaprashan* on Immunity. The general findings in the current review of these studies suggest that *Swarnaprashan* significantly improves the immunity as compared to control group as evident by improvement in level of IgA, IgG and IgM. Study Rana A. et.al, 2021[12] also assessed the effect of *Swarnaprashan* on subjective parameters as measures of morbidity that are frequency of episodes of RTI and GIT infections. *Swarnaprashan* was reported to reduce the incidences of infection significantly at p value <0.001. However study Uppinakuduru et.al, 2021 concludes that changes observed in the levels of immunoglobulins were not statistically significant in the present study setup. So it can be considered that, *Swarnaprashan* has a positive role in modulating immunity and reducing the frequency of infections in pediatric age group.

Effect on ITQOL:

Out of five studies, only Rathia S. et.al, assessed the effect of *Swarnaprashan* on ITQOL parameters which showed significant results in improving only the physical abilities of ITQOL parameters. The data suggests that *Swarnaprashan* has major role to play in mental growth and development of children.

Effect on Hematological Biochemical Parameters/ Assessment of Safety:

All the four studies assessing the safety of *Swarnaprashan* found that the hematological, and biochemical parameter were not altered after administration of *Swarnaprashan*. All the parameter such as CBC, LFT, RFT was found within normal limit post intervention of trial drug. This suggests that *Swarnaprashan* can be safely administered to children aged from infant stage till 16 years and has got no adverse effect.

Limited lab investigations were done in most of the studies especially immunological outcomes which show the need for further research on biochemical and immunological parameters on larger groups. The further study included a wide range which limited the validity of the conclusions. The ongoing and unpublished dissertations works in many colleges could not be retrieved which reduced the amount of research already done. But future systematic reviews can be done in specific age groups, for examples, neonates.

CONCLUSION

Small number of Randomized controlled clinical trials involving the intervention of *Swarnaprashan* in pediatric

age group and assessing their role were reviewed in the present study that proves the role of *Swarnaprashana* in enhancing the cognition, physical growth, development as well as protection against the diseases by enhancing the immunity. Thus *Swarnaprashan* could serve as drug of multimodal action at various levels which could lead complete development of child. Additional researches on the role of *Swarnaprshan* including larger sample size and standard assessment criteria are of merit considering the multinomial potential of this formulation.

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FLOW DIAGRAM SHOWING THE SCOPING REVIEW PROCESS ADAPTED FROM THE PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) STATEMENT

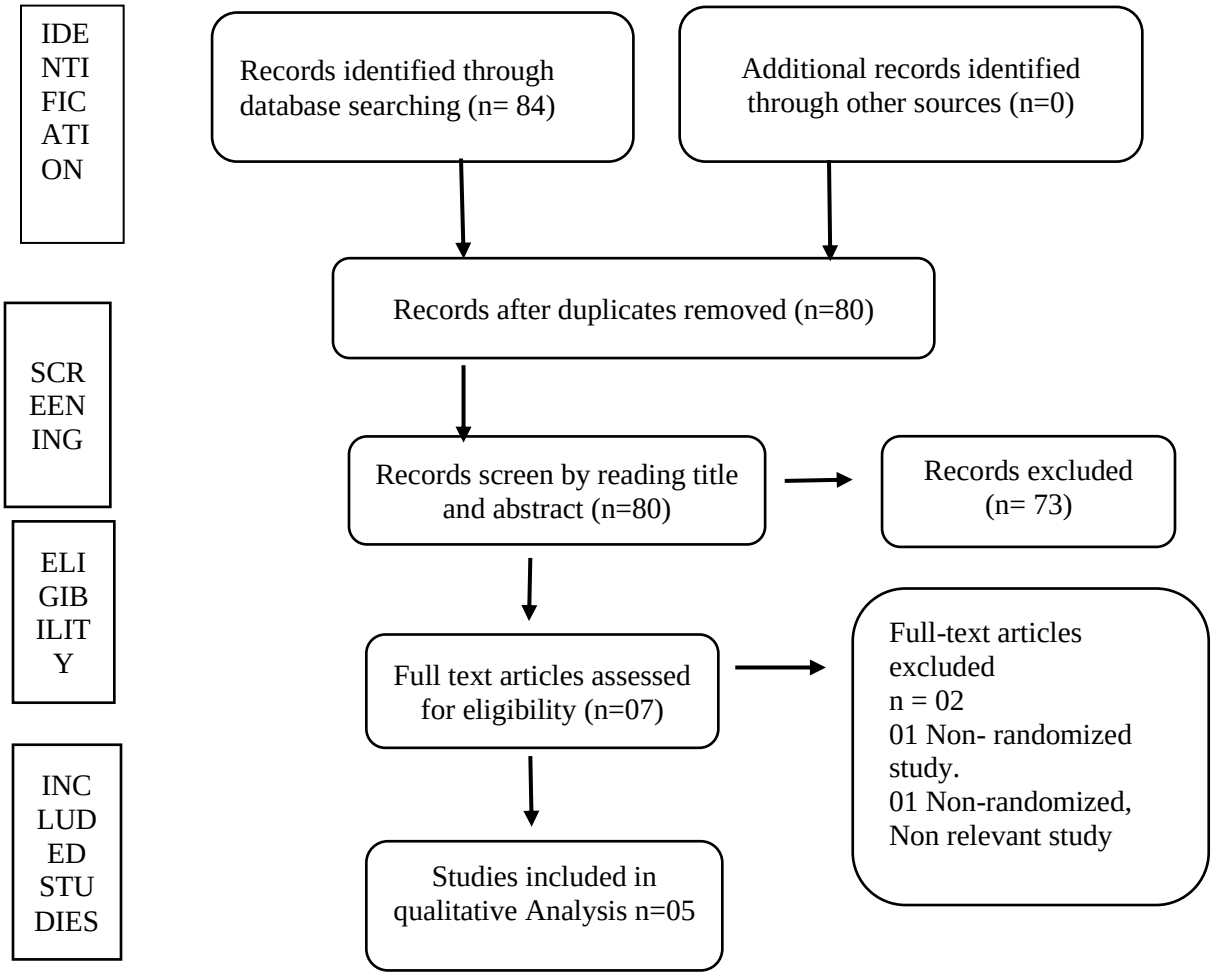

Table No. 01: General characteristics of included studies

Study Titles	Study Design	Sample Size	Intervention /Formulation along with contents	Duration/ Timing of intervention	Control	Study Population
1. Rathia S. et.al, 2021[6]	A randomized, controlled, single-blind clinical study	n= 119 Group A (n = 39) Group B: (n = 42 Group C: (n = 38,	Group A: *Ghrita and Madhu*). Group B: *Swarna bhasma*, *Ghrita* and *Madhu*), Group C: *Swarna bhasma*, *Ghrita*, *Madhu* and *Vacha Churna).*	In the morning for 4 weeks	Group B: *Swarna bhasma*, *Ghrita and Madhu)*	Infants aged 0–12 months.
2. Bhaskaran J. et.al, 2019[7]	A randomized, controlled, single-blind, single-center, parallel-group, phase II trial	n=102 Healthy infants Group A: (n = 56) Group B: (n = 46)	*Swarnaprashana* [Mixture of *Swarna bhasma* (processed gold), honey and *Ghrita*)]	Once a day in the morning for 28 days	Mixture of honey and *Ghrita*	Healthy full-term infants aging 1 day to 12 months of either sex
3. Rana A. et.al, 2021[8]	Controlled, clinical trial	n=60 Children Group A: (n=30) Group B: (n= 30)	*Swarnamritaprashana*, *Swarna bhasma*, 4000 ml of *Kashaya* of *Guduchi* green stem (reduced to quarter) was taken and 1000 ml of ghee along with *Kalka of Brahmi*, *Vacha*, *Jatamamsi*, *Yashtimadhu*, *Ashwagandha*, *Shankpushpi*, *Pippali Choorna* (40 gm each)	On *Pushyanak shatra* of every month for 9 month	GroupB: (Control group) No drug	Children aged 3-5 years
4. Uppinakduru S. et. al, 2021[9]	Randomized double-blind placebo- controlled interventional prospective clinical trial wherein	n=221 Healthy	*Swarnamritaprashana* soft gel capsule (containing 2 mg of *Swarna bhasma*) in morning empty stomach along with lukewarm water	For a duration of 30 days.	Control group – sugar syrup	Children within the age group of 6–12 years
5. Ramteke RD et.al, 2014[10]	Controlled clinical trial	n=120 Children consisting 60 male and 60 female genders Trial group, Control Group,– 60 each	*Swarna bhasma* 10 mg, *Vacha Ghana* 2 gm, *Kushta Ghana* 2 gm, cow's ghee 5 gm, honey 25 gm.	On *Pushya nakshata* of followed on every 27th day.	Control Group- *Madhu Jala*.	Age from 0 to 12 years.

Table No. 02. Intervention and Methodology

Study Titles	Dosage of intervention	Follow up details	Outcome measures	Results	Risk of bias
1. Rathia S. et.al, 2021	*Swarnaprashana* orally once day *Madhu* and *Ghrita* not fixed. Dosage of *Vacha* and *Swarna bhasma* fixed according to age using Fried's rule	Total 3 follow-ups 1. On 4th week 2.On 8th week (post-treatment 4th week) 3. On 12th week (post treatment 8th week).	Infant toddler quality of life parameters (ITQOL), Anthropometry, Hematological parameters, Biochemical parameters, Immunological	Trial group showed significant difference on the anthropometry, hematological and biochemical parameters whereas trial drug showed highly significant improvement in bodily pain / discomfort, statistically significant effect on general health and parent impact (Time), no S.D on rest parameters of ITQOL.	Dosing of *Madhu* and *Ghrita* were not fixed and inconsistent
2. Bhaskaran J. et.al, 2019	Dosage of *Swarna bhasma* was fixed by following Fried's rule. specific proportion (1:4 in drops) of Ghrita and honey	On review (at 2 weeks) in between. Follow-up was for a period of 8 weeks.	Primary outcome – changes in immunological profile. Secondary outcome-changes in anthropometry parameters to monitor changes in growth and liver and kidney function tests to rule out any toxic effects in the body	No statistical differences between the trial (*Swarnaprashana*) and control groups (honey and *Ghrita*) on the anthropometry. 84.5% of the infants in the trial group and 60% of the infants in the control group showed normalization of IgG values	Randomization technique not mentioned.
3. Rana A. et al 2021	4 drops of *SwarnamritaPrashana*, (equivalent to 1.2 mg of *Swarna bhasma*) •	----------	Subjective Parameters: • Measures of morbidity (RTI, GITI) •Parental feedback on general health of child. Objective Parameters: •Anthropometry for height, weight, chest circumference, mid-arm circumference. •Laboratory Parameters: Complete Blood Count •Immunoglobulin Test: IgG,	Experimental Group showed 33.16% improvement on IgG levels after the treatment, which was statistically significant with value = 0.004 whereas in control group it was non-significant with p value 0.245, 59% improvement on episode of RTI and GIT infection as compared to controlled group.	Randomization was not done. Follow-up details not mentioned

			Hamilton's Depression rating scale and self-prepared scale		
4.Uppinakuduru S. et. al, 2021	Dose was 1 gelatinous capsule of 0.4 ml and the time of administration was empty stomach in morning	For 30 days after completion of treatment	Primary parameters such as serum IgG and salivary immunoglobulin A. secondary parameters such as recurrence of infections, activities, and other subjective parameters	Better than placebo in improving immunity at the level of immunoglobulin which was evident by the changes seen in the levels of serum IgG and salivary IgA, though the changes observed in the levels of immunoglobulins were not statistically significant in the present study setup *Swarnamritaprashana* was found to be better than placebo in the promotion of *Bala* (Strength) in children as reflected by improvements in parameters representing *Dehabala, Manobala,* and *Agnibala*.	Randomization technique not mentioned. Number of Subjects in each group not specified.
5.Ramteke RD et.al, 2014	Quantity of *Swarna bhasma* 1 mg/kg body weight.	14 dose of SP	Assessment of weight and height	Average height and weight gain in male and female group is seen slightly more in trial group than that of in control group.	Lack of sound criteria for assessment. Randomization not done.