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Improve your Child's Immunity, Cognition and Memory through use of Swarn-Prashan: The Honey-Gold-Ghee Emulsion - A brief overview

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ABSTRACT: Swarna Prashana (SP) is a conventional Ayurvedic pediatric formulation comprising purified gold nanoparticles (Suvarna Bhasma), honey (Madhu), and ghee (Ghrita). Traditionally administered to infants and children, it is intended to promote cognitive development, boost immunity, and enhance overall vitality. Contemporary scientific research substantiates these traditional claims. Gold nanoparticles (AuNPs) within the formulation exhibit immunomodulatory, anti-inflammatory, and neuroprotective properties by regulating cytokine production and enhancing immune cell function. Honey provides antimicrobial, antioxidant, and prebiotic benefits while stabilizing the gold particles. Ghee serves as a critical lipid-based medium, facilitating lymphatic absorption and targeting immune tissues. The honey-ghee-gold suspension also provides "trained immunity", besides enhancing memory and brain development.



INTRODUCTION

Swarna Prashana (SP) is an ancient Ayurvedic tradition, based on the classical Honey-Ghee (clarified butter) combination. By adding micronized gold in nanogram amounts to the honey-ghee suspension, the formulation is powerfully enhanced, and promotes intellect (*medhā*), digestion (*agni*), and immunity (*bala*) in infants [1, 2]. In contemporary times, the tradition still survives in India via the practice of placing honey on a newborn's tongue. The *Kāśyapa Samhitā*, a seminal hoary text on Ayurvedic pediatrics, classifies SP as a "Lehana" (licking) preparation [2]. Contextualized by modern science, this combination forms a stable, bioactive nano-suspension [3]. Within this complex, ghee acts as a lipid based drug delivery system (LBDDS) that facilitates target-specific delivery to lymphatic tissues, heart, and brain by bypassing first-pass hepatic metabolism [4,5]. Consequently, SP functions as a traditional, non-toxic, oral "nano-vaccine" for broad immunological modulation [6, 7, 8].

GOLD – THERAPEUTIC ASPECTS

Historically valued in medicine for millennia, elemental gold and gold nanoparticles (AuNPs) are recognized as biocompatible and non-toxic at nanogram (for infants) and milligram doses in adults [8-11]. AuNPs display versatile therapeutic potential in inflammation control, antimicrobial action, neuroprotection, and cancer treatment [Figure 1].

Anti-inflammatory and Immunomodulatory Effects

Animal models demonstrate that AuNPs reduce pro-inflammatory markers including TNF- α , IL-1 β , and reactive oxygen species (ROS) [12,13,14]. They also enhance immune activation; specifically, ultra-small AuNPs trigger NF- κ B pathways to increase antibody production [11].

Antimicrobial Properties

AuNPs exhibit potent antibacterial effects, even against drug-resistant strains, via membrane disruption and Reactive oxygen species (ROS) generation [15]. They further serve as drug delivery vehicles, significantly enhancing the efficacy of antibiotics like kanamycin and cefaclor [16,17]. Functionalized AuNPs have been shown to provide targeted antibacterial and antiviral activity [18,19].

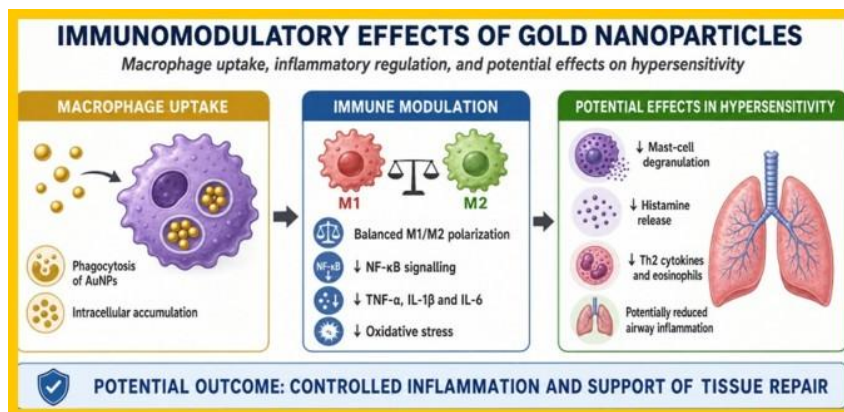


Figure 1. The actions of gold nanoparticles on macrophage polarization, immune modulation and reduced hypersensitivity

Neuroprotection

Ultra-small AuNPs in picogram doses help maintain neurons by preventing nitric oxide-induced demyelination, and reverse brain damage in Alzheimer's models [20,21].

HONEY -- COMPOSITION, HEALTH BENEFITS, AND THERAPEUTIC EFFECTS

Honey is a complex bioactive product synthesized by honeybees through the collection, enzymatic transformation, and concentration of floral nectar and pollen. It is composed of sugars, enzymes, amino acids, minerals, and polyphenols [22]. Clinical evidence shows it reduces the duration of diarrhea, which is a common affliction in infants [23]. It exhibits broad-spectrum antimicrobial activity through peptides like Jelleins, and displays prebiotic potential by promoting beneficial gut flora [24,25,26]. Furthermore, honey possesses strong antioxidant and cardiometabolic benefits [27,28,29].

Ghee – The natural drug carrier

Ghee is a natural lipid carrier traditionally used in Ayurvedic formulations (ghrita). Its lipid matrix can dissolve or incorporate lipophilic phytochemicals, protect certain bioactive constituents, and enhance their intestinal solubilisation and absorption. During digestion, ghee promotes mixed-micelle and chylomicron formation, thereby facilitating the systemic and lymphatic transport of lipid-soluble compounds. This was substantiated by an experimental study on rats, wherein cow ghee significantly increased the oral bioavailability of the carotenoid lutein in mice [30].

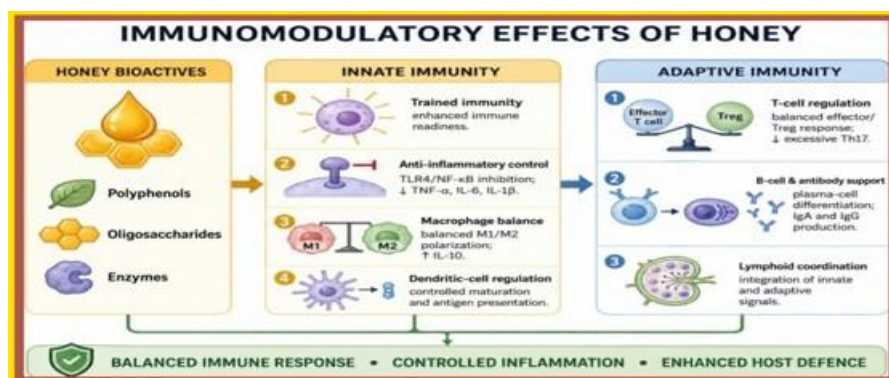


Figure 2. Effects of honey constituents on trained immunity, body metabolism and oxidative injury.

Medicated *ghrita* (ghee infused with herbal extracts) formulations have also been shown to contain submicron vesicular structures capable of incorporating botanical constituents. Thus, ghee may be regarded as a traditional natural carrier with properties analogous to modern lipid-based delivery systems. [4,31]. Contrary to public perception, dietary ghee in moderate amount does not harm lipid profiles [32]. It also possesses neuroprotective and cognitive-enhancing properties [33].

Trained Immunity

The concept of “trained immunity” is now being recognized in scientific circles [Figure 3]. When taken for a few weeks or months, SP has been shown to increase immunoglobulin levels (IgG, IgM), offering broad infection protection similar to “trained immunity” effects [34]. In uncomplicated language, this training of the immune system can be divided into three stages.

Initial stimulus

During the first exposure, pathogens or inflammatory signals activate innate immune cells such as monocytes and macrophages. This stimulation initiates intracellular signaling and prepares the cells for functional adaptation.

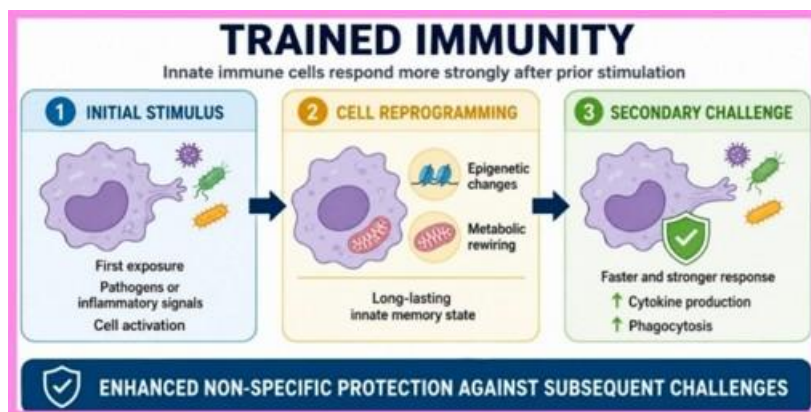


Figure 3. Mechanism of trained immunity. Initial stimulation induces epigenetic and metabolic reprogramming of innate immune cells. This produces a long-lasting memory-like state, enabling a faster and stronger response to subsequent challenges.

Cell reprogramming

Activated cells undergo epigenetic changes and metabolic rewiring. These relatively persistent alterations establish a trained state, enabling innate immune cells—or newly generated cells from trained progenitors—to retain a form of non-specific functional memory.

Secondary challenge

Upon later exposure to the same or a different stimulus, trained innate immune cells respond faster and more energetically. They may show increased cytokine production, enhanced phagocytosis, and improved pathogen clearance, although excessive activation can also promote inflammation.

Clinical Evidence of the benefits of SP

Clinical trials involving over 200 infants showed SP improves physical growth and enhances humoral immunity (IgG, IgM) with no adverse effects [35,36]. Practitioners report observed benefits including reduced illness frequency and accelerated developmental milestones [37].

DISCUSSION

Swarna Prashana effectively integrates Ayurvedic wisdom with modern biomedical insights. The trituration of gold, honey, and ghee creates stabilized gold nanomaterials functionalized with honey-derived peptides and oligosaccharides [3]. Enveloped in a lipid layer by ghee, these particles enter systemic circulation via intestinal lacteals, bypassing hepatic clearance

[4, 5]. Modern science confirms AuNPs, honey, and ghee all possess substantial, complementary therapeutic benefits regarding immune regulation and tissue repair.

CONCLUSION

For over two millennia, Ayurveda has prescribed Swarna Prashana to enhance infants' and childrens' development and resilience [37]. This traditional electuary is supported by scientific evidence showing gold nanoparticles regulate inflammation and enhance antigen presentation, while raw honey provides antimicrobial, antioxidant, and stabilizing effects. Ghee acts as an advanced lipid delivery system, facilitating absorption and directing components to lymphatic tissues. Crucially, the synergy in SP may provide a basis for "trained immunity," epigenetically reprogramming innate immune cells to boost non-specific defense at mucosal entry points. Practitioner surveys endorse its efficacy in reducing illness and enhancing cognition, marking SP as a viable, culturally compatible method for early-life immune enhancement.

REFERENCES

- [1] Nelaturi P, Nagarajan P, Sabapathy SK, Sambandam R. Swarna Bindu Prashana-an Ancient Approach to Improve the Infant's Immunity. *Biol Trace Elem Res*. 2021;199(6):2145-2148. DOI: 10.1007/s12011-020-02353-y
- [2] Sarma H, editor. *Kasayapa Samhita of Acharya Kashyapa, Sutra Sthana*. Ver. 25-28. Reprint Edition. Ch. 18. Varanasi: Chaukhambha Sanskrit Sansthan, 2019; 6.
- [3] Bali, S. and Parajiya, R. From Immunosenescence to Immunocompetence by Use of Lipid Delivered Nano Gold-The Dynamics of an Oral Vaccine against SARS-CoV 2. *EC Gastroenterology and Digestive System*. 2020; 7:58-75.
- [4] Bali S, Prasad S, Saini V. Ayurvedic lipid based rasayans - A perspective on the preparation and pharmacological significance of lipids on the bioavailability of phytoconstituents. *J Ayurveda Integr Med*. 2022 Apr-Jun;13(2):100526. doi: 10.1016/j.jaim.2021.09.004.
- [5] Bali S and Saini V. Ghee - The Cooking Medium for Good Health. *Emerging Challenges in Agriculture and Food Science*. 2021; Vol. 2.
- [6] Nelaturi P, Nagarajan P, Sabapathy SK, Sambandam R. Swarna Bindu Prashana-an Ancient Approach to Improve the Infant's Immunity. *Biol Trace Elem Res*. 2021;199(6):2145-2148.
- [7] Verma, S., Rathia, S., Chandravanshi, L. and Gupta, P.K. Swarna Prashana—faith in the embrace of research. *Journal of Complementary and Integrative Medicine*. 2022; 19(2):161-172. DOI: 10.1515/jcim-2021-0394
- [8] Sumbayev, V., Yasinska I.M., Garcia C.P., et al. Gold nanoparticles downregulate interleukin-1 β -induced pro-inflammatory responses. *Small*. 2013; 9:472–77. doi:10.1002/smll.201201528
- [9] Berners-Price SJ, Filipovska A. Gold compounds as therapeutic agents for human diseases. *Metallomics*. 2011; 3:863–873. DOI: 10.1039/c1mt00062d
- [10] Richards, D. G., McMillin, D. L., Mein, E. A., & Nelson, C. D. (2002). Gold and its relationship to neurological/glandular conditions. *International Journal of Neuroscience*, 112(1), 31–53. <https://doi.org/10.1080/00207450212018>
- [11] Sharma, M., Salisbury, R.L., Maurer, E.I., et al. Gold nanoparticles induce transcriptional activity of NF- κ B in a B-lymphocyte cell line. *Nanoscale*. 2013; 5(9):3747-3756. DOI: 10.1039/c3nr30071d
- [12] Thaïs Gomes de Carvalho, Vinícius Barreto Garcia, Aurigena Antunes de Araújo, Luiz Henrique da Silva Gasparotto, et al. Spherical neutral gold nanoparticles improve anti-inflammatory response, oxidative stress and fibrosis in alcohol-methamphetamine-induced liver injury in rats, *International Journal of Pharmaceutics*, Volume 548, Issue 1, 2018, Pages 1-14. <https://doi.org/10.1016/j.ijpharm.2018.06.008>.
- [13] Dohnert, M.B., Ferreira, G.K., Silveira, P.C.L. et al. Inflammatory Cytokines Content in Achilles Enteropathy after Phonophoresis Treatment Combined with Gold Nanoparticles and Diclofenac Diethylammonium in Rats. *Inflammation* 38, 1044–1049 (2015). <https://doi.org/10.1007/s10753-014-0069-x>
- [14] Leonavičienė, L., Kirdaitė G., Bradūnaitė R., et al. Effect of gold nanoparticles in the treatment of established collagen arthritis in rats. *Medicina (Kaunas)*. 2012; 48:91–101.
- [15] Dheyab, M.A.; Aziz, A.A.; Oladzadabbasabadi, N., et al. Comparative Analysis of Stable Gold Nanoparticles Synthesized Using Sonochemical and Reduction Methods for Antibacterial Activity. *Molecules*. 2023; 28: 3931. doi: 10.3390/molecules28093931

- [16] Payne JN, Waghvani HK, Connor MG, et al. Novel synthesis of Kanamycin conjugated gold nanoparticles with potent antibacterial activity. *Front Microbiol.* 2016; 7:607. <https://doi.org/10.3389/fmicb.2016.00607>
- [17] Katas H, Moden NZ, Lim CS, et al. Biosynthesis and potential applications of silver and gold nanoparticles and their chitosan-based nanocomposites in nanomedicine. *J Nanotechnol.* 2018; 2018:1–13. <https://doi.org/10.1155/2018/4290705>
- [18] Wang S, Yan C, Zhang X, et al. Antimicrobial peptide modification enhances the gene delivery and bactericidal efficiency of gold nanoparticles for accelerating diabetic wound healing. *Biomater Sci.* 2018; 6:2757–2772. DOI: 10.1039/c8bm00807h
- [19] Li J, Cha R, Zhao X, et al. Gold nanoparticles cure bacterial infection with benefit to intestinal microflora. *ACS Nano.* 2019; 13:5002–5014. DOI: 10.1021/acsnano.9b01002
- [20] Khosravi, M., Karami, M., Nadoushan, M.J., and Hajnorouzi, A. Myelin enhancement of Multiple sclerosis model with gold nanoparticles into the corpus callosum. *Nanomedicine Journal.* 2019; 6(4). Doi: 10.22038/nmj.2019.06.0000010
- [21] dos Santos Tramontin, N., da Silva, S., Arruda, R., et al. Gold nanoparticles treatment reverses brain damage in Alzheimer's disease model. *Molecular neurobiology.* 2020; 57: 926-936. DOI: 10.1007/s12035-019-01780-w
- [22] Nurul Syazana MS, Gan SH, Halim AS, et al. Analysis of volatile compounds of Malaysian Tualang (*Koompassia excelsa*) honey using gas chromatography mass spectrometry. *Afr J Tradit Complement Altern Med.* 2012; 10:180–8. Doi: 10.4314/ajtcam.v10i2.2
- [23] Haffeejee IE, Moosa A. Honey in the treatment of infantile gastroenteritis. *Br Med J (Clin Res Ed).* 2015; 290:1866–7. 115-119. DOI: 10.1136/bmj.290.6485.1866
- [24] Brudzynski, K. and Sjaarda, C. Honey glycoproteins containing antimicrobial peptides, Jelleins of the Major Royal Jelly Protein 1, are responsible for the cell wall lytic and bactericidal activities of honey. *PLoS One.* 2015; 10(4):e0120238. <https://doi.org/10.1371/journal.pone.0120238>
- [25] Danihlák, J., Aronstein, K. and Petřivalský, M. Antimicrobial peptides: A key component of honey bee innate immunity. *Journal of Apicultural Research.* 2015; 54(2):123-136. <https://doi.org/10.1080/00218839.2015.1109919>
- [26] Sanz, M.L., Polemis, N., Morales, V., Corzo, N., Drakoularakou, A., Gibson, G.R. and Rastall, R.A. In vitro investigation into the potential prebiotic activity of honey oligosaccharides. *Journal of agricultural and food chemistry.* 2005; 53(8):2914-2921. DOI: 10.1021/jf0500684
- [27] Gheldof N, Wang XH, Engeseth NJ. Buckwheat honey increases serum antioxidant capacity in humans. *J Agric Food Chem.* 2003; 51:1500–5. DOI: 10.1021/jf025897t
- [28] Rasad, H.; Entezari, M.H.; Ghadiri, E., et al. The effect of honey consumption compared with sucrose on lipid profile in young healthy subjects. *Clin. Nutr. ESPEN.* 2018; 26, 8–12. DOI: 10.1016/j.clnesp.2018.04.016
- [29] Majid, M.; Younis, M.A.; Naveed, A.K., et al. Effects of natural honey on blood glucose and lipid profile in young healthy Pakistani males. *J. Ayub Med. Coll. Abbottabad.* 2013; 25, 42–45. <https://ayubmed.edu.pk/jamc/index.php/jamc/article/view/1628>
- [30] Bhat I, Madhura RJ, Badanthadka M, Mamatha BS. Cow ghee as an efficient carrier to improve oral bioavailability of lutein. *Food Chem.* 2022;389:133046. doi:10.1016/j.foodchem.2022.133046.
- [31] Duraipandi S, Selvakumar V, Er NY. Rediscovering nano drug delivery systems in Ayurvedic lipid-based formulations. *Indian J Tradit Knowl.* 2018;17(2):381–385
- [32] Sharma, H., Zhang, X., & Dwivedi, C. (2010). The effect of ghee (clarified butter) on serum lipid levels and microsomal lipid peroxidation. *AYU (an International Quarterly Journal of Research in Ayurveda)*, 31(2), 134–140. <https://doi.org/10.4103/0974-8520.72361>
- [33] Singh, Y., Ansari, A., Singh, V., Parhate, S., Sharma, R. P., & Singh, T. R. (2023). Therapeutic potential of Kalyanaka Ghrita (polyherbal-medicated Ghrita) in purview of Alzheimer's disease: A literary review. *Journal of Drug Research in Ayurvedic Sciences*, 8(3), 201–212. https://doi.org/10.4103/jdras.jdras_164_22
- [34] Netea, M.G., Giamarellos-Bourboulis, E.J., Domínguez-Andrés, J., et al. Trained immunity: a tool for reducing susceptibility to and the severity of SARS-CoV-2 infection. *Cell.* 2020; 181(5):969-977. DOI: 10.1016/j.cell.2020.04.042
- [35] Rathia, S., Chandravanshi, L., Kori, V.K., Patel, K. and Gupta, P.K. Immunological, Biochemical, and Infant-Toddler Quality of Life Parameter Based Study of Swarna Prashana in Infants. *Pharmacognosy Research.* 2021; 13(1). DOI:10.4103/pr.pr_69_20

- [36] Bhaskaran JK, Patel KS, Srikrishna R. Immunomodulatory activity of Swarna Prashana (oral administration of gold as electuary) in infants - A randomized controlled clinical trial. *Ayu.* 2019 Oct-Dec;40(4):230-236. doi: 10.4103/ayu.AYU_33_19.
- [37] Sarkar, P.K. Swarnaprashana: Traditional Ayurvedic measure to improve immunity in children by nanogold suspension. *Journal of Drug Research in Ayurvedic Sciences.* 2024; 9(4): 204-210. DOI: 10.4103/jdras.jdras_72_24
- [38] Antony, C., Chandla, A., Vyas, K., and Sannd, R. Knowledge, Attitude and Practice Survey of Prashana in Neonates among Ayurvedic Practitioners. *Journal of Ayurveda.* 2022; 16(2): 119-125. DOI: 10.4103/joa.joa_369_21