



Research Article

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EFFECT OF SWARNAMRITAPRASHANA ON GROWTH AND DEVELOPMENT IN INDIAN TODDLERS

Kannan Sagar ¹, Shailaja U ², Arun Raj GR ^{3*}, Kavya Mohan ¹, Ganga Narendran ¹

¹PG Scholar, Department of Kaumarabhritya, Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, Hassan, Karnataka, India

²Professor, Department of Kaumarabhritya, Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, Hassan, Karnataka, India

³Assistant Professor, Department of Kaumarabhritya, Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, Hassan, Karnataka, India

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*Corresponding author

E-mail: drdrarunraj26@gmail.com

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ABSTRACT

Open labeled non randomized normal control prospective clinical trial at outpatient level. Children in the age group of 1 to 2 years fulfilling the inclusion criteria were recruited and allocated into two groups. In study group, subjects received four drops of Swarnamritaprashana (orally) for nine consecutive months on every Pushya Nakshatra. Subjects in the control group were not given any drug, which formed the basis for comparison of the effects with study group. Mean gain in weight, length, head circumference, mid upper arm circumference and chest circumference was more in study group compared to control group. Assessing motor age, development quotient and deviation quotient-motor age, while comparing both the groups, study group shown significant change in study group ($p < 0.001$), ($p < 0.001$) and ($p < 0.001$) respectively and in control group ($p < 0.001$), ($p < 0.001$) and ($p < 0.05$) respectively. In Mental age, Development quotient and deviation quotient-mental age, while comparing both the groups, study group shown significant change in study group ($p < 0.05$), ($p < 0.001$) and ($p < 0.001$) respectively, when compared to a non-significant change in control group. Monthly once administration of Swarnamritaprashana for nine consecutive Pushya Nakshatra have accentuated the process of growth and development in toddlers, hence can be understood as a positive health care program in children.

Keywords: swarnamritaprashana, swarna prashana, swarna bhasma, growth and development, pushya nakshatra, toddlers.

INTRODUCTION

Growth and development begins at conception and ends at maturity. Early childhood is a time of tremendous growth and development. With their first steps, babies become toddlers-the word describing the characteristic way they spread their legs and toddle from side to side. As the toddlers fall between the fully dependent infants and the relatively independent pre-schoolers, it is a transition period from complete dependence to relative independence¹. When compared with first year of life, a decreased growth rate is seen in this period². It is the age group, where parents expresses concern about poor intake as a result, growth becomes slower, so health is an area of concern in this age group of children³. In order to help our children grow and develop to the best of their potential in life, regular monitoring is very important.

The primary aim of Ayurveda is the promotion of health and prevention of diseases⁴. We can find various references and formulations in Ayurvedic literature, which promote physical and mental health of child⁵. Swarna Prashana is such a formulation, containing Swarna mixed with Madhu and Ghrita⁶ in the form of Prashana (lickables)⁷. Acharya Kashyapa explains it as Medhya and Agnibala vardhaka, Ayushya, Mangala, Punya, Vrishya, Varnya, and Grahapaham⁸. Swarna Prashana has been modified with scientific inputs and references from Ayurvedic classical literatures to Swarnamritaprashana. It is a health promoting drop, given on every Pushya Nakshatra, regularly as public health initiative by Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, Hassan, Karnataka, India since May, 2009.⁸

In 200 ml of Guduchi (*Tinospora cordifolia* Thunb. Miers)⁹ green stem Kashaya (water extract), 50 ml of Ghee was added along with 2 gm powder of each Brahmi (*Bacopa monnieri* (L.) Pennell)¹⁰, Vacha (*Acorus calamus* L.)¹¹, Pippali (*Piper longum* L.)¹², Shankhapuspi (*Convolvulus pluricaulis* Choisy)¹³, Ashwagandha (*Withania somnifera* (L.) Dunal)¹⁴⁻¹⁵, Jatamamsi (*Nardostachys jatamansi* D. Don DC.)¹⁶, Yastimadhu (*Glycyrrhiza glabra* L.)¹⁷⁻¹⁹ and Maricha (*Piper nigrum* L.)²⁰ and 50 ml of Murchita Ghrita (processed ghee) and cooked on low flame according to preparation of medicated ghee as referred in Ayurvedic literature. Swarna Bhasma (1.2 gram) and honey (50 ml) are added to this ghrita and triturated on the day of Pushya Nakshatra²¹. The bowl of Swarnamritaprashana is kept in warm water to maintain the consistency. This preparation is administered orally in a dose of 4 drops (containing 2 mg of Swarna Bhasma) to each child. Hence a clinical trial was planned to evaluate the effect of Swarnamritaprashana on growth and development parameters of Indian toddlers (1 to 2 years).

OBJECTIVES

- To evaluate the effect of Swarnamritaprashana on Growth parameters of Toddlers (1 to 2 years).
- To evaluate the effect of Swarnamritaprashana on Development of Toddlers (1 to 2 years).

Ethical considerations: Ethical clearance was obtained from the Institutional Ethics Committee (IEC) of Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, Hassan,

Karnataka (IEC No.SDM/IEC/52/2014-15). Dated: 04-April-2015. Informed consent (assent) was obtained from the parents before registering the child for the trial.

MATERIALS AND METHODS

Source of data

Freshly registered toddlers, attending the Swarnamritaprashana programme on the day of Pushya Nakshatra in Sri Dharmasthala Manjunatheswara College of Ayurveda and Hospital, Hassan.

Method of collection of data

Apparently healthy children were screened for growth and development using Standard Assessment Scale.

Data with respect to Growth- collected through anthropometry (length, weight, head circumference, chest circumference, mid-arm circumference).

Data with respect to Development- milestones (gross motor, fine motor, speech and language, social and adaptive) were collected by direct observation and interrogation with parents.

Inclusion Criteria

Healthy children, of age group 1 to 2 years (who have completed 1 year and till the completion of 2 years of age) irrespective of gender, religion and socio-economic status were included in the study.

Exclusion Criteria

Children who were already receiving Swarnamritaprashana, suffering from Congenital anomalies, Inborn Errors of metabolism and any Acute systemic illness.

Diagnostic Criteria

Apparently healthy toddlers of the age group 1 to 2 years

Study Design

Open labeled non randomized normal control prospective programmed clinical trial at outpatient level.

Sample Size: 80

Sampling Method

Consecutive Sampling Method.

Grouping

Children in the age group of 1 to 2 years fulfilling the inclusion criteria, whose parents were consciously willing to participate their children in the study were recruited and allocated into the Study group and Control group.

Group S (Study Group): Subjects received 4 drops of Swarnamritaprashana (equivalent to 2mg of Swarna bhasma). It was repeated for nine consecutive months on every Pushya Nakshatra.

Group C (Control Group): Subjects in this group were not given any drug. It formed the basis for comparison of the effects with Study group (Group S). Children in both the groups were observed monthly for evaluation of Growth and Development

using specially designed proforma and Trivandrum Developmental Screening Chart (TDSC).

Dose of swarnamritaprashana: 4 drops of Swarnamritaprashana (equivalent to 2mg of Swarna bhasma).

Route of administration: Oral Route.

Duration of study: 9 Months

Assessment criteria

The subjects in both the groups were assessed using:

- Anthropometry:** Length, Weight, Head Circumference, Chest circumference, Mid-arm circumference and
- Trivandrum Developmental Screening Chart (TDSC)**, on every visits and assessed for Development using
- Developmental Assessment Screening for Indian Infants (DASII)** in the start and end of the trial.

Statistical Methods

Data of children, who received minimum of 6 doses of Swarnamritaprashana were statistically analyzed and tabulated using statistical package for social sciences (SPSS) version 20. 65(35+30) children were taken for statistical analysis. (15 drop outs excluded). Data related to demographics and vital case history was analyzed using descriptive statistics. Summary of nominal and ordinal data were expressed in range percentage. The numerical data were expressed in Mean \pm SD. The nominal and ordinal data were analyzed using non parametric tests like Wilcoxon Signed Rank test, Friedman's test with Wilcoxon Signed Rank test as post hoc with Bonferroni correction. Numerical data were analyzed using paired t test and repeated measure ANOVA with paired t test as post hoc. The changes observed to be less than 0.05 were considered as significant. Difference between two groups related to was calculated using unpaired t test and Mann-Whitney U test for numerical and ordinal data.

OBSERVATIONS AND RESULTS

A total of 80 children were registered for the study, in that 65 have completed the study and 15 were drop outs. 35 children from the Study group has completed and 9 dropouts. While in control group, 30 has completed and 6 dropouts were found. All children who were registered for the study were coming under 1 year to 1 year 3 months age group so that none of them were crossing 2 years of age after 9 months of study duration. 40% were females while 60% were male gender. 88.8% children belong to Hindu community, 8.8% from Muslim community, 1.3 % of children from Christian Community and 1.3% from Jain community. 41.3% belonged to Upper middle class, 28.8% Lower middle class, 20% Upper class, 6.3% Upper lower class and 3.8% from lower class. 67.5% belonged to rural community and 32.5% belonged to urban community. 41.2% children were from extended family, 40% from nuclear family and 18.2% children were from Joint family. 100% mothers have got regular antenatal checkups. 100% mothers received proper supplementation. 62.5% were born by Normal vaginal delivery and 37.5% were born by LSCS. 98.75% children were born with full term gestation, whereas 1.25% children were born as preterm. 80% received first feed within an hour, whereas 17.5% received within 24 hours and 2.5% belongs to others. 90% received breast feeding and 10 % were formula fed. 57.5% were given complimentary feeds, whereas 42.5% were not given. 58 were receiving surry, 24.2% were receiving fruits and 17.8% were receiving vegetables. 41.2% children were fed with

minimum efforts, 57.5% children with convincing techniques and 1.3% was fed with much efforts. 82.5% children with adequate food intake, 15% children with little more than

adequate and 2.5% children with less food intake. 98.7% children are with completed immunization as per their age and 1.3% children with incomplete immunization.

Table 1: The effect on anthropometrical parameters within the groups

Parameter	Group	Source	Df	Mean Square	F	P value	Remarks
Weight	Control	Sphericity assumed	9	6.749	283.778	0.000	S
		Greenhouse-Geisser	3.369	18.030	283.778	0.000	S
	Study	Sphericity assumed	9	16.716	408.573	0.000	S
		Greenhouse-Geisser	2.381	63.191	408.573	0.000	S
Length	Control	Sphericity assumed	9	59.395	1190.871	0.000	S
		Greenhouse-Geisser	2.317	230.710	1190.871	0.000	S
	Study	Sphericity assumed	9	81.350	2794.966	0.000	S
		Greenhouse-Geisser	2.600	281.644	2794.966	0.000	S
Head circumference	Control	Sphericity assumed	9	18.231	28.299	0.000	S
		Greenhouse-Geisser	4.800	34.180	28.299	0.000	S
	Study	Sphericity assumed	9	40.767	641.195	0.000	S
		Greenhouse-Geisser	.904	126.330	641.195	0.000	S
Mid upper arm circumference	Control	Sphericity assumed	9	8.093	311.036	0.000	S
		Greenhouse-Geisser	5.153	14.134	311.036	0.000	S
	Study	Sphericity assumed	9	14.755	378.916	0.000	S
		Greenhouse-Geisser	5.397	24.605	378.916	0.000	S
Chest circumference	Control	Sphericity assumed	9	22.457	476.247	0.000	S
		Greenhouse-Geisser	5.092	39.962	476.247	0.000	S
	Study	Sphericity assumed	9	54.881	551.180	0.000	S
		Greenhouse-Geisser	1.864	264.978	551.180	0.000	S

S – Significant

Table 2: The effect on anthropometrical parameters between the groups

Parameter	Mean Study	Mean Control	Mean Difference	Std. Error Difference	t	p	REMARKS
Weight_BT	8.6769	8.4217	-0.25519	0.12712	-2.007	0.049	S
Weight_AT	10.7346	9.8930	-0.84157	0.15221	-5.529	0.000	S
Length_BT	74.3286	72.3000	-2.02857	0.38518	-5.267	0.000	S
Length_AT	78.8857	76.5833	-2.30238	0.36672	-6.278	0.000	S
HC_BT	44.5000	44.8167	0.31667	0.25307	1.251	0.216	NS
HC_AT	47.7043	47.1167	0.58762	0.21412	-2.744	0.008	S
MUAC_BT	13.6571	13.600	-0.5714	0.06815	-0.838	0.405	NS
MUAC_AT	15.5729	15.0667	-0.50619	0.08176	-6.192	0.000	S
CC_BT	44.4857	44.2167	-0.26905	0.28896	-0.931	0.356	NS
CC_AT	48.1000	46.8500	-1.25000	0.24416	-5.120	0.000	S

S – Significant; NS – Non significant, BT: Before Treatment, AT: After Treatment

Table 3: The effect on development quotient in motor age and mental age (within the group)

Parameter	Group	Mean	Mean Diff.	SD	SD Mean	t value	Df	p value	Remarks
Motor age_BT	Study	89.8451	-3.19400	7.04421	1.19069	-2.682	34	0.011	S
Motor age_AT		93.0391							
Motor age_BT	Control	86.0163	7.37900	3.36861	0.61502	11.998	29	0.000	S
Motor age_AT		78.6373							
Mental age_BT	Study	90.261	-5.83771	4.24601	.71771	-8.134	34	0.000	S
Mental age_AT		96.099							
Mental age_BT	Control	88.925	-38700	4.8756	.89016	-435	29	0.667	NS
Mental age_AT		89.312							

S – Significant; NS – Non significant, BT: Before Treatment, AT: After Treatment

Table 4: The effect on development quotient in motor age and mental age (between the groups)

Parameter	Group	N	Mean Diff.	SE Mean	t value	p value	Remarks
Motor age_BT	Study	35	-14.40181	.79054	-18.218	0.000	S
Motor age_AT							
Motor age_BT	Control	30	-3.82881	.98818	-3.875	0.000	S
Motor age_AT							
Mental age_BT	Study	35	-6.78681	0.71764	-9.457	0.000	S
Mental age_AT							
Mental age_BT	Control	30	-1.33610	1.06949	-1.249	0.216	NS
Mental age_AT							

S – Significant; NS – Non significant, BT: Before Treatment, AT: After Treatment

Table 5: The effect on deviation quotient in motor age and mental age (within the group)

Parameter	Group	Mean	Mean Diff.	SD	SD Mean	t value	Df	p value	Remarks
Motor age_BT	Study	78.5503	-12.731	11.390	1.9253	-6.612	34	0.000	S
Motor age_AT		91.2817							
Motor age_BT	Control	74.6770	-6.665	5.954	1.0870	-6.13	29	0.000	S
Motor age_AT		81.3423							
Mental age_BT	Study	82.4629	-6.499	7.9990	1.35209	-4.807	34	0.000	S
Mental age_AT		88.9623							
Mental age_BT	Control	80.5620	10.121	9.5655	1.7463	5.796	29	0.000	S

S – Significant, BT: Before Treatment, AT: After Treatment

Table 6: The effect on deviation quotient in motor age and mental age (between the groups)

Parameter	Group	N	Mean Diff.	SE Mean	t value	p value	Remarks
Motor age_BT	Study	35	-9.93945	1.71526	-5.795	0.000	S
Motor age_AT							
Motor age_BT	Control	30	-3.87329	1.46874	-2.637	0.011	S
Motor age_AT							
Mental age_BT	Study	35	-18.52195	1.74272	-10.628	0.000	S
Mental age_AT							
Mental age_BT	Control	30	-1.90086	2.3178	-0.820	0.415	NS
Mental age_AT							

S – Significant; NS – Non significant, BT: Before Treatment, AT: After Treatment

Total 80 children were registered, of which 65 has completed and 15 cases were drop outs. In Study group, a total of 44 children were registered for the study, out of which 35 have completed the study and 9 were drop outs. Whereas in Control Group, a total of 36 children were registered and out of which 30 has completed the study and 6 were drop outs. The results showing the effect on anthropometrical parameters within the group is detailed in table 1. The results showing the effect on anthropometrical parameters between the groups is detailed in table 2. The results showing the effect on development quotient in motor age and mental age within the group is detailed in table 3. The results showing the effect on development quotient in motor age and mental age between the groups is detailed in table 4. The results showing the effect on deviation quotient in motor age and mental age within the group is detailed in table 5. The results showing the effect on deviation quotient in motor age and mental age between the groups is detailed in Table 6.

DISCUSSION

By analyzing the benefits of Swarnamritaprashana, it is very clear that it aims to yield all round development of the child by its Rasayana effect²². Rasayana²³ is a unique concept of Ayurveda, that is claimed to increase the lifespan, intelligence, strength and able to prevent the disease²⁴. Rasayana drugs leads to proper production of Bala i.e. Yuktikrita Bala²⁵. It is also able to improve the power of Agni and by this enriches the status of different Dhatu, thereby helps in proper growth and development in children. i.e. Labhopyo hi Shastanam Rasadinam Rasayanam²⁶. When the ingredients and the nature of the drugs of Swarnamritaprashana were taken into consideration, it can be understood that Swarnamritaprashana may be attributed with following characteristics. Since maximum ingredients are Madhura, Tikta, Kashaya rasa predominant, Sheeta Veerya, Madhura Vipaka, in general drugs having Deepaniya, Brimhana, Balya, Rasayana and Medhya action. Specific action of these ingredients is Rasayana and Medhya (nootropic) which in-turn may help to attain growth and development in a significant manner.

Guduchi²⁷, Ashwagandha²⁸⁻³⁰ and Jatamansiare having Tikta rasa and Usna Virya. By virtue of Tikta Rasa³¹ it helps in removing Agnimandya (reduced digestive power), improves

taste, reduces thirst, removes Kleda (unwanted metabolic waste) - free radical scavenging and antioxidant activity³². The drugs like Swarna, Madhu, Ghrita, Yastimadhu³³ are having Madhurarasa, and the other drugs in study group Swarna, Ghrita, Madhu, Brahmi, Ashwagandha³⁴, Shankhapushpi, Yashtimadhu, Pippali all are having Madhura Vipaka. Madhura rasa³⁵ and Madhura Vipaka influences Shadindriya Prasadana (nourishing and augmenting all sensory perceptions) – at cytosolic as well as at gene expression level which improves strength, and complexation. Jeevana (Promotive) - increases the circulation into the CNS system and balance the sugar levels in the blood³⁶, Sthairyakara (stabilizing) - neuro protection by directly or indirectly modulating activities of ATPases and establishes connectivity. Exhibit interaction with GABAergic modulators³⁷ (Sandhanakara) - by immunostimulation and increasing the synthesis of acetylcholine³⁸. While the specific action Medhya drugs produces target action at Hrdaya (CNS) by improving Satva Guna (sensory perception and neuronal arborisation mediated through neurotransmitters³⁹⁻⁴⁰ immunomodulatory⁴¹ DHA and omega 3 fatty acids are vital and other effects of the drug contribute for overall health promotion of growth and development. The evidence based studies also support these facts.

Although, special attention has been given to the mental status and intelligence of the child, equal importance also has been given to physical, social, personal and immunity aspects⁴². This also prevents from the non-specific immunity of the body and offers an average resistance to all common infections by reducing the severity of diseases. The role of medhya dravyas is in brain growth, which is very rapid in the first two years of life⁴³. Administration of medhya dravyas during this period of rapid growth of brain produces high quality neurons, so that the child will have excellent cognitive levels in the future⁴⁴. Medicated ghrita crosses blood brain barrier due to its lipophilic nature⁴⁵. Hence, ghee is the most suitable form of medication to increase memory and neurostimulant effect⁴⁶. The relationship of Swarna with immune system is well established by the research works⁴⁷. Antigenic property of madhu is well known⁴⁸. To increase Ojus by increasing shukra dhatu either by rasayana or vajeekarana chikitsa has been attempted in Swarnamritaprashana. This will in turn increases the Kshamatwa of the body by imparting rasayana, balya,

vajeekarana effect to increase the yuktikrita bala which will tone up body's immune cells and impart anti-oxidant property or decrease the oxidative injury by arresting the process of decaying. That all in turn helps in maintaining a healthy state.

CONCLUSION

Traditional health care practices in children are still widely accepted in the society, especially in a convenient and modified manner as per the needs of the modern era. Monthly once administration of Swarnamritaprashana for nine consecutive Pushya Nakshatras has accentuated the process of Growth and Development. Monthly once administration of Swarnamritaprashana for 9 consecutive Pushya Nakshatras has showed significant improvement in Development and Deviation quotients of motor and mental age respectively; thereby improvement in mean total score and performance. In a nut shell, Swarnamritaprashana (modified Swarna Prashana) can be understood as a positive health care programme in children, which has a role in growth and development in toddlers (1 to 2 years).

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