ISSN: 2322 - 0902 (P)
ISSN: 2322 - 0910 (O)

International Journal of Ayurveda and Pharma Research

Research Article

EFFECT OF *ASHWAGANDHA GHRITA* AND *ASHWAGANDHA* GRANULES ON GROWTH W.S.R. OF BIOCHEMICAL VALUES

Rakesh Kumar Mishra

Reader & HOD, Dept. of Kaumarbhritya, Government Ayurveda College, Junagadh, Gujarat, India.

ABSTRACT

Imagination of a "*Shareeramadyam khalu dharma sadhanam*" is not the new slogan, but rooting to the depth of history of ancient Indian literatures. *Brumhana* therapy is very well documented in literary works from the antiquity by *Charaka* and *Sushruta*. The term *Brumhana* refers to increase in the size or bulk of the body which ultimately refers to growth. *Charaka* has indicated *Brumhana* therapy in both healthy and diseased conditions. The "*Bhashajya Ratnavali*" clearly refers regarding the potency and use of "*Aswagangha Ghrit*" for the purpose of *Brumhana*; especially for children. Thus an effort had been made to prove the validity of the growth (increase in bulk of *Dhatus* - cellular to molecular level) in paediatric practice with support of physical, haematological and biochemical evaluation and another venture was made on the unexplored topic of *Ashwagandha Ghrita* which is compared with *Ashwagandha Granules*.

In this study total 111 children completed the treatment and they were randomly divided in three groups Viz. A, B & C. In Group-A, *Ashwagandha Ghrita* was administered in 41 children, In Group-B, *Ashwagandha Granule* was administered in 36 children, and in Group- C *Placebo capsules* was administered in 34 children, whereas better percentage of improvement was seen in Group A.

KEYWORDS: *Ashwagandha Ghrita, Ashwagandha* Granules, Growth of children, Withanoloids.

INTRODUCTION

Brumhana is the important regimen and *Acharya* Charaka[1] refers it to an increase in the size or bulk of body, largely due to accumulation of all *Rasa-Rakta to Uttarottar Dhatu* which nourishes *Mamsha Dhatus* and gives strength to body[2].

Generally, *Brumhana* used as an increase in size[3] while in modern science *Brumhana* can be attributed to cell reproduction there by effecting the growth and development during the intrauterine life as well as during extra uterine life[4]. The growth and development of human body from a single fertilized egg to a trillion of cells involves cell growth[5], cell replication and cell differentiation. *Brumhana* indicated in both healthy and diseased conditions[6], here it is also specified that *Bala* and *Vriddha* needs more nutrition. There is a clear cut reference in *Bhaishajya Ratnavali* regarding *Brumhana; Brumhana* drug is especially considered for children[7]. *Brumhana* is related with *Pustikaraka, Santarpana* and *Mamsavardhaka*[8]. Here in this study, an effort is made to evaluate the growth (increase in bulk of *Dhatus* - cellular to molecular level) with the "*Ashwagandha Ghrita"* and "*Ashwagandha Granules".*

Material and method

In the study, *Ashwagandha ghrita* and *Ashwagandha granules* were selected for evaluation of physical growth and biochemical assessment of children. Children having symptoms of stunting growth were selected from OPD & IPD of Kaumarbhritya department of IPGT&RA, Gujarat Ayurved University, Jamnagar. The drugs viz. *Ashwagandha ghrita* and *Ashwagandha granules* were made available from the pharmacy of Gujarat Ayurved University, Jamnagar.

Posology: the form of *Ghrita* and Granules of *Ashwagandha,* were selected for physical and biochemical assessment where the dose, duration, grouping, *Anupana* and Route of administration etc. are given in table 1.

Table 1: Drug and Dose distribution

Drug schedule		***Ashwagandha Ghrita* (Group A)**	***Ashwagandha* Graules (Group B)**	**Placebo (Group C)**
Dose	3-7 yrs. old	2.5 - 4 gm (cons.)	2.5 - 4 gm (cons.)	2.5-4 gm (cons.)
	8-12yrs. old	6 - 8 gm (cons.)	6 - 8 gm (cons.)	6 - 8 gm (cons.)
Duration		One and half month		
Anupana		Lukewarm water		
Route of administration		Oral		

All children were exposed to natural surroundings and uniform care and followed uniform diet pattern.

Criteria of selection of children

Children having classical symptoms of growth retardation (under height, underweight & of retarded growth) were selected after examination with Body Mass Index, anthropometry measurements (height, width, weight, chest & calf circumference) with haematological and Biochemical assessment from OPD/ IPD, with irrespective of age of 3 years to 12 years and those who fulfill the diagnosis without any complications.

Criteria of exclusion: Children, who were having any complications (such as HIV, Hepatitis B or other viral diseases) chronic illnesses and hereditary diseases were excluded.

Investigation: The routine *Blood*, *Urine* and *Stool* investigations were carried out before and after treatment in all patients to evaluate his/her general health/illness and Biochemical investigations like Total Proteins, A/G ratio and Serum Blood Urea were carried out for his/her physical assessment. All the pathological and biochemical investigations were carried out in the pathology and biochemistry laboratory of IPGT&RA, Gujarat Ayurved University, Jamnagar.

Observations: In Group-A, *Ashwagandha Ghrita* was administered in 41 children, In Group-B *Ashwagandha* Granules was administered in 36 children and in Group-C Placebo capsule was administered in 34 children and all were completed the course.

49.59% children belonged to the age group of 10 - 12 years, followed by 35.54% of children of 7 - 9 years and 14.88% of children were of 3 - 6 years; 97.52% children were of Hindu religion; 78.38% were boys; 32.23% children were studying in secondary, 28.93% in upper primary, 23.14% in lower primary and 10.74% were studying in nursery while 4.96% of children were Pre-school going; 85.95% children were taking regular diet; 59.50% children were having *Krura Kostha* and 34.71% *Mridu Kostha*; 66.12% children were having *Avara Abhyavaharan Shakti* while 28.93% of children were having *Madhyama Abhyavaharan Shakti*.

In *Aharaja Nidana*, 35.5% *Pramitashanam*, 24.8% were taking *Vataja Ahara* while *Anashana* was observed in 11.6%. Maximum number of children i.e. 80.2% were noted to be lean and thin, 78.5% were Underweight followed by 69.4% of children were having *Dourbalya* and 63.6% were complaining leg cramps, 10.7% were having wrinkle on face, 4.13% and 4.95% of children were found to be suffering from Stomatitis and Chilosis respectively.

Table 2: Effect of therapy on anthropometrical measurement of 111 children

Height (cms)	**n**	**Mean BT**	**Mean AT**	**XI**	**%**	**SD**	**SE**	**t**	**P**
Group A	41	117.7	118.5	0.82	0.70	0.60	0.09	8.72	<0.001
Group B	36	119.4	120.3	0.88	0.74	0.47	0.07	11.1	<0.001
Group C	34	125.2	125.7	0.55	0.44	0.50	0.08	6.46	<0.001
Width (cms)	**n**	**Mean BT**	**Mean AT**	**XI**	**%**	**SD**	**SE**	**t**	**P**
Group A	41	119.7	120.04	0.35	0.29	0.47	0.07	4.74	<0.001
Group B	36	121.52	121.69	0.16	0.13	0.37	0.06	2.64	<0.05
Group C	34	127.32	127.52	0.20	0.16	0.41	0.070	2.92	<0.01
Chest circum. (cms)	**n**	**Mean BT**	**Mean AT**	**XI**	**%**	**SD**	**SE**	**t**	**P**
Group A	41	49.43	50.73	1.29	2.61	0.59	0.09	13.99	<0.001
Group B	36	55.02	55.84	0.81	1.48	0.38	0.06	12.91	<0.001
Group C	34	55.47	56.36	0.89	1.61	0.50	0.08	10.37	<0.001

On anthropometric measurement on Height, Group B shows almost percentage of improvement followed by Group A & C, while on Width, Group A shows highly significant result at P<0.001 with followed by Group C & B. On the statistical evaluation of Chest circumference, highly significant result was found in group A, followed by group C &B.

Table 3: Statistical analysis of Mid arm, Mid-calf, Mid-thigh circumference

***Mid arm circum.* (cms.)**	***n***	***Mean BT***	***Mean AT***	**XI**	***%***	***SD***	***SE***	***t***	***P***
Group A	41	14.60	15.82	1.21	8.34	0.52	0.08	14.87	<0.001
Group B	36	15.44	16.27	0.83	5.39	0.41	0.06	12.07	<0.05
Group C	34	15.47	16.10	0.63	4.08	0.35	0.06	10.39	<0.001
***Mid-calf circum.* (cms.)**	***n***	***Mean BT***	***Mean AT***	**XI**	***%***	***SD***	***SE***	***t***	***P***
Group A	41	18.97	20.14	1.17	6.16	0.53	0.08	14.10	<0.001
Group B	36	20.88	21.93	1.04	4.98	0.59	0.09	10.59	<0.001
Group C	34	20.32	21.86	0.54	2.67	0.33	0.05	9.49	<0.001
***Mid-thigh circum.* (cms.)**	***n***	***Mean BT***	***Mean AT***	**XI**	***%***	***SD***	***SE***	***t***	***P***
Group A	41	27.46	28.82	1.36	4.97	0.59	0.09	14.77	<0.001
Group B	36	28.36	29.40	1.04	3.67	0.57	0.09	10.81	<0.001
Group C	34	29.29	30.05	0.76	2.61	0.53	0.09	8.25	<0.001

For Mid arm circumference, Group A showed highly significant result at P<0.001 followed by Group C. On Calf circumference and mid-thigh circumference Group A, B & C showed highly significant result at P<0.001.

Table 4: Statistical analysis of Weight variation in Group A, B, C

Weight(Kg)	*n*	*Mean BT*	*Mean AT*	XI	*%*	*SD*	*SE*	*t*	*P*
Group A	41	18.51	20.51	2.0	10.80	0.88	0.13	14.54	<0.001
Group B	36	20.63	22.30	1.66	8.07	0.89	0.14	11.18	<0.001
Group C	34	22.61	23.85	1.23	5.46	0.83	0.14	8.60	<0.001

For Weight, all Groups were highly significant but percentage of improvement was far above the ground in Group A.

EFFECT OF THERAPY ON HAEMATOLOGICAL VALUES

Table 5: Statistical analysis of Haemoglobin levels in Group A, B, C

Hb(g/dl)	*N*	*Mean BT*	*Mean AT*	XI	*%*	*SD*	*SE*	*t*	*P*
Group A	41	11.35	11.76	0.40	3.60	0.68	0.10	3.85	<0.001
Group B	36	11.29	10.93	-0.35	-3.17	0.95	0.15	-2.26	>0.10
Group C	34	11.51	10.69	-0.82	-7.17	1.27	0.21	-3.79	>0.10

On Effect of haematological therapy, Haemoglobin showed highly significant result at P<0.001 in group A while group B & C shows significant result.

EFFECT OF THERAPY ON BIOCHEMICAL VALUES

Table 6: Statistical analysis of Biochemical Values in Group A, B, C

Total Protien (g/dl)	**n**	**Mean BT**	**Mean AT**	**XI**	**%**	**SD**	**SE**	**t**	**P**
Group A	41	6.97	7.18	0.21	3.07	0.48	0.07	2.82	<0.01
Group B	36	6.97	7.11	0.13	1.99	0.41	0.06	1.98	>0.05
Group C	34	7.22	6.81	-0.41	-5.70	0.35	0.06	-6.73	>0.10
Albumin (g/dl)	**n**	**Mean BT**	**Mean AT**	**XI**	**%**	**SD**	**SE**	**t**	**P**
Group A	41	4.01	4.14	0.12	3.15	0.29	0.04	2.73	<0.01
Group B	36	4.05	3.99	-0.05	0.27	-1.43	0.28	-1.24	>0.10
Group C	34	4.13	3.89	-0.23	-5.76	0.22	0.03	-6.11	>0.10
Globulin (g/dl)	**n**	**Mean BT**	**Mean AT**	**XI**	**%**	**SD**	**SE**	**t**	**P**
Group A	41	2.95	3.03	0.08	2.72	0.31	0.04	1.65	>0.10
Group B	36	2.96	3.13	0.16	5.61	0.34	0.05	2.87	<0.01
Group C	34	3.10	2.99	-0.10	-3.41	0.34	0.05	-1.8	>0.10
A/G ratio	**n**	**Mean BT**	**Mean AT**	**XI**	**%**	**SD**	**SE**	**t**	**P**
Group A	41	1.32	1.35	0.03	2.20	0.14	0.02	1.30	>0.10
Group B	36	1.34	1.28	-0.05	-4.33	0.15	0.02	-2.2	>0.10
Group C	34	1.32	1.31	-0.01	-0.88	0.15	0.02	-0.45	>0.10
S. Cholesterl (mg/dl)	**n**	**Mean BT**	**Mean AT**	**XI**	**%**	**SD**	**SE**	**t**	**P**
Group A	41	148.6	149.5	0.92	0.62	20.44	3.19	0.29	>0.10
Group B	36	152	145.8	-6.16	-4.05	24.31	4.05	-1.52	>0.10
Group C	34	153.1	145.4	-7.6	-4.9	26.93	4.61	-1.6	>0.10
S. Creatinine (mg/dl)	**n**	**Mean BT**	**Mean AT**	**XI**	**%**	**SD**	**SE**	**t**	**P**
Group A	41	0.76	0.72	-0.03	-5.11	0.15	0.02	-1.61	>0.10
Group B	36	0.79	0.80	0.01	1.74	0.13	0.02	0.59	>0.10
Group C	34	0.86	0.83	-0.02	-3.40	0.14	0.02	-1.15	>0.10
Blood Urea (mg/dl)	**N**	**Mean BT**	**Mean AT**	**XI**	**%**	**SD**	**SE**	**t**	**P**
Group A	41	20	21.36	1.36	6.82	9.94	1.55	0.88	>0.10
Group B	36	17.80	19.75	1.94	10.92	5.74	0.95	2.03	<0.05
Group C	34	21.32	21.44	0.11	0.55	5.39	0.92	0.12	>0.10
B.U.N. (mg/dl)	**n**	**Mean BT**	**Mean AT**	**XI**	**%**	**SD**	**SE**	**t**	**P**
Group A	41	9.34	9.98	0.63	6.82	4.64	0.72	0.88	>0.10
Group B	36	8.32	9.22	0.90	10.92	2.65	0.44	2.05	<0.05
Group C	34	9.96	10.01	0.05	0.55	2.48	0.42	0.129	>0.10

Amount of 'total protein' increased and highly significant result was found in group A, and as an Upshot Albumin shows highly significant result at P<0.01, but Globulin shows improvement in percentages only. S.Cholesterol & S.Creatinine shows insignificant result in group A, B & C. Blood urea and Blood urea nitrogen shows significant result at P<0.05 in group B while improvement of percentage was found in group A followed by C.

On statistical calculation, in most of the parameters, *Ashwagandha Ghrita* showed significant effect in comparison to *Ashwagandha* Granules and Placebo.

GROUP WISE, TOTAL EFFECT OF THERAPY

Table 7: Total Effect of Therapy in Group A, B, C

	Group A	Group B	Group C
On 16 cardinal symptoms	34.97	23.72	16.99

In all the 16 cardinal symptoms the group A (*Ashwagandha ghrit)* showed 34.97% of improvement and in group B where *Ashwagandha* Granules were administered 23.72 % improvement was observed and in group C where placebo is administered 16.99% of improvement was observed.

OVERALL EFFECT OF THERAPY

The overall effect of therapies on three groups of study showed that all the three groups remained unchanged and hence the percentage improvement was found insignificant statistically.

DISCUSSION

In the present study two pharmaceutical forms of *Ashwagandha* were used one in *Ghrita* form and other in Granules form. To rule out the psychological effect a separate placebo group was also maintained in the study.

The drug *Ashwagandha Ghrita* consists of three drugs viz. *Ashwagandha*, cow's milk and *Go Ghrita. Ashwagandha* have Withanoloids which acts as natural steroid compound[9] whereas cow's milk has proteins, vitamins and minerals. *Go Ghrita* has lipophilic property, and action of *Ghrita* facilitates transportation of active principles of the formulation to the target organ, thus *Ashwagandha* in *Ghrita dosage form works* better.

Thickness of skin fold depends upon high level of protein, fat and site of fat deposition and it may be due to the influence of test drugs, which chemically intensifies the formation of phospholipids, fatty acids[10], which significantly increases the skin fold thickness and improves body mass also. Ultimately Protein synthesis (*Mamsa-Med-vardhana*) might have helped in improvement of circumference of chest, mid arm, calf and thigh, which ultimately increases body weight [11].

In anthropometric measurements, good results were found in Group A and Group B while in Group C negative result was observed. The childhood period is a period of growth, and for which adequate nourishment is vital, each child has his own pattern of growth, and this ratio varies from one child to another; which even do affects the results of clinical interventions, however in the present study, improvement observed in Group A was better than the other two groups.

Ashwagandha is having property of natural protein whereas cow's milk and cow's *Ghrita* is having proteins, vitamins and mineral properties. Cow's *Ghrita* is best among *Sneha*[12], having *Yogvahi* property which ultimately intensifies the penetration (of *Sneha* based substances) through the cell membrane and is responsible for saturation which directly affects the body mass by protein synthesis. Begum VH and Sadique J (1988) have also observed that *Withaferine A* is better for prevention of loss of body weight[13.] The WHO Technical Report Series 916 Diet, Nutrition and the Prevention of Chronic Diseases approves only natural sugars as carbohydrates for unrestricted consumption[14]. Natural sugars comes from fruit, grains and vegetables in their natural or cooked form. Change in Chest circumference transforms in the expanding capacity of lungs; withanoloids, the protein faction in *Ashwagandha* influences the chest by increasing amount of alveolar line of lungs[15].

Protein and A/G ratio level, depends upon general condition of the Health, *Ashwagandha Ghrita* have higher nutritional values and have multi-dimensional effect on body; Which results in increasing of protein and A/G ratio. Withanoloids are considered to interact with the protein synthesis and thus influence many modular proteins[16]. Therefore it also results in rise of haemoglobin level.

This may have a role for increasing of protein and A/G ratio level. Albumin shows significant result in group A, i.e. high serum levels found in *Ashwagandha Ghrita.* Group B & C shows insignificant result means low serum levels found in those treated children.

Albumin is the protein of the highest concentration in plasma. Which transports many small molecules in the blood like bilirubin, calcium, etc. and it may synthesised in the liver. Low serum occurs in protein malnutrition. The exogenous protein metabolism has been accelerated for building up of the tissue proteins in the body and at the same time decrease in the creatinine within normal range suggests that, the tissue protein catabolism has been lowered down and exogenous source of protein is being used for the construction of body and thus anabolic effect has been started.

Blood urea and blood urea nitrogen shows significant result in group B. while non-significant result in group A & C. However similarly urea being end product of exogenous protein metabolism when increased indicate dietary protein catabolism.

According to Ayurvedic concepts, the consumption of four types of high quality of *Ahara* (*Bhakshya, Bhojya, Peya* and *Lehya[17])* changes into higher calorie of *Ahara-rasa[18]*, which is the source of energy. At this juncture either effect of *Guna-panchaka* or *Samskara* various fluids making its bonds loosen, act on it with the help of "*Kledak Kapha*" [19] in the form of *Ghrita* and milk which increases *Kapha*. Then "*Samana Vayu*" [20] helps in movement, "*Pachakpitta[21]*" stimulates the *Agni*, and on last digested food converts into *Ahara-rasa* which acts on transformation of one tissue into another in a particular order through the activity of respective "*Dhatwagni*"*[22]* and by the sequence of process of *Dhatu-nirmana*, *Shariri*k*-mamsha-vridhi* occurs because Ghee is having *Yogvahi* and *Sanskaranuvarti[23]*property which facilitates transportation of ingredients formulation to target organ, as a result in form of *Ghrita Ashwagandha* works better than other form which does effect on growth

Drug as per the Hypothesis and it can fulfill the aims with the principle "*Purvahpurvoativar-dhatvatvardhayeddhiparam param"*[24]. The selected drug *Ashwagandha* possessed the expected qualities and said *Brumhaniya* property which was given to the children in the *Ghrita* and Granules form. In the *Ghrita* form also carries the properties which are expected to increase the *Rasa-raktadi dhatu. Ghrita* and Granules form has been proved to have its effect on the *Kapha-vardhaka* and *Vāta-pitta Shamak*[25] which are usually influence for growth of children. Presently science also accepts the Nutritive and Digestive actions of *Ashwagandha* which are potentiated with the milk and *Ghrita.*

CONCLUSION

Childhood is the growing period and *Brumhaniya* drug intensifies the growth of children which is observed in Group A. Subjective parameters have been supported with objective criteria i.e. haematological and biological values. It may be difficult to give a definite conclusion here based on clinical significance alone due to differences in data. However Haemoglobin, Total Serum Proteins, Blood Urea and Blood Urea Nitrogen levels (BUN) of Group A shows a slightly higher differences as compared to group B and it clearly indicates better response of trail drug used in this group i.e. *Ashwagandha Ghrita*.

Ashwagandha Ghrita shows higher percentage of increasing due to chemical constituents, *Ghrita* is having *Yogavahi* and *Samsakaranuvartan* property and chemically it consists of phospholipids and fatty acid which results in increase of body mass.

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Cite this article as:
Rakesh Kumar Mishra. Effect of Ashwagandha Ghrita and Ashwagandha Granules on Growth w.s.r. of Biochemical Values. International Journal of Ayurveda and Pharma Research. 2015;3(12):7-12.
Source of support: Nil, Conflict of interest: None Declared

***Address for correspondence**
Dr. Rakesh Kumar Mishra
Reader & HOD
Dept. of Kaumarbhritya
Government Ayurveda College,
Junagadh, Gujarat, India,
Email: drrakeshmishraji@gmail.com
Mobile: 9898695204