

Clinical study to evaluate the *Brinhaniya* effect of *Vidarikandadi Yog* to enhance the sport performance in children

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ABSTRACT

Background: Sport science studies applications of scientific principles and techniques with the aim of improving sports performance. **Objective:** Present research work was carried out with the aim to enhance the sport performance of children. **Materials and Methods:** Randomized double blind placebo controlled study was conducted in children involved in sports to assess the efficacy of trial drug "*Vidarikandadi Yog*". Total of 72 healthy students were selected for the study after screening 412 students. Out of them, 60 students completed the study. The students were randomly divided into two groups. Group A (*Vidarikandadi Yog*) comprising of 38 and Group B (placebo) of 34 students. The trial drug "*Vidarikandadi Yog*" was given in the dose of 200 mg/kg/day in two divided doses for 2 months with milk and follow up was conducted fortnightly. **Results:** The study revealed the statistically significant results for weight and chest circumference, whereas highly significant results were obtained for muscular strength and endurance assessment parameters (Push-up Test, Sit-up Test, and Hand Grip Strength Test). Change in Ruler Drop Test was not significant. Results were significant for cardio-respiratory parameters (Resting Heart Rate, Resting Respiratory Rate, and Harvard Step Test). **Conclusion:** *Vidarikandadi Yog* is a potential drug for enhancing the sport performance due to its *Brinhaneeya* effect.

Key words: *Brinhana*, muscular strength, sport performance, *Vidarikandadi Yog*

INTRODUCTION

Sport science is the application of science and its principles to the field of sport. This branch has recently developed and it is enriching with a jet speed. Sport science can help athletes to improve their sport performance in a variety of ways – physically, mentally, and technically. This science not only looks after the weakness of players but also help to potentiate them for better performance.

Ayurveda is the science of life, which deals with each and every aspect of life. For maintenance and promotion of health, role of *vyayam* (exercise/structured physical activities) is of great importance. In school, children get involved in various physical activities which fall under the sports. Application of *Ayurveda* principles along with *Ayurvedic* formulations are thought to boost the performance of school children. The primary goal of this research was to help children find the success in sport they need. Every child can be successful at one sport or another. Need is to judge that talent and pave the way for their success in that particular sport.

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Aim and objective

The present study has been carried out with the following objective:

- To evaluate the efficacy of *Vidarikandadi Yog* in enhancing the sport performance in school students.

Type of study

Randomized double blind placebo controlled study.

MATERIALS AND METHODS

Selection of cases

Participants for the present study were selected randomly from various schools of Jaipur city. Total of 72 healthy

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students were selected for the study after screening 412 students. Out of them, 60 students completed the study and 12 discontinued for personal reasons.

Randomization

The participating students for the present study were randomly divided into two groups. Group A comprising 38 students were treated with *Vidarikandadi Yog* and Group B of 34 students was given placebo.

The coded materials (Study drug/Placebo) was given as per instructions. The coding of study drug and placebo was done by another person who was not involved in therapy or assessment. Code document was sealed and kept in a safe custody. The envelope was opened only after completing the study to decode it for interpretation. Observations documented during study were analyzed and findings were evaluated by using statistical analysis to establish the efficacy.

Trial therapy

Study drug

A formulation named *Vidarikandadi Yoga*, is modified form of original reference from *Yogratnakar* [Table 1].^[1]

The formulation was modified in the form of Granules to enhance its palatability and easy administration in pediatric age group. The trial drug was prepared in the pharmacy of National Institute of Ayurveda, Jaipur.

Placebo

The placebo for the study was also in the form of granules prepared from sugar and colored like drug.

Dose and duration

The trial drug "*Vidarikandadi Yog*" was given in the dose of 200 mg/kg/day in two divided doses for 2 months with milk and follow up was conducted fortnightly.

Inclusion criteria

- Students of either sex and age between 13 to 15 yrs
- Physically and mentally healthy students
- Those are free from oblivious abnormality or ill health
- Child/parents not willing to continue the treatment.

Exclusion criteria

- Students with physical illness or disability

Adverse effect evaluation criteria

To document possible adverse effects of studied drug,

Table 1: Ingredients of study drug

Drugs	Latin name	Ratio	Parts
Vidarikanda	<i>Pueraria tuberosa</i> ^[2]	2 Parts	Tuber
Godhum	<i>Triticum aestivu</i> ^[3]	2 Parts	Seed
Yava	<i>Hordeum vulgare</i> ^[3]	1 Part	Seed
Sugar		5 Parts	
Ghrit		1 Part	

clinical criteria were used. It incorporated the records of information from the patient on each and every follow up, related to the features as change in appetite, sleep, drowsiness, irritability, nausea, vomiting, pain in abdomen, loose stool, constipation and other non specific symptoms.

Assessment criteria

For assessment of efficacy of trial drug following parameters were adopted:

Objective criteria

- Body composition assessment - Anthropometry (height, weight, chest circumference, mid arm circumference, mid thigh circumference)
- Cardio-respiratory assessment - Harvard Step Test (HST, step up and down off a gym bench for 5 minutes at a rate 30 steps/minute)^[4]
- Muscular strength assessment - Push-Ups Test (PUT, push-ups per minute)^[4] Sit-Ups Test (SUT, sits up completed per minute)^[4] Hand Grip Strength Test (HGST, squeezing the dynamometer with maximum isometric effort, maintained for about 5 seconds)^[4]
- Reaction Time Assessment - Ruler Drop Test (RDT)^[4]

Follow-up and monitoring

All registered cases (children) were called for follow up after every 15 days. At every follow up, values for anthropometric variables and objective criteria were recorded.

Ethical clearance

The present research work was reviewed and discussed by Institutional Ethics Committee and has been approved on 09 April 2012 (Letter no-F10 (5)/EC/2012/292).

Assessment of results and progress

The data of the clinical study was analyzed after the treatment for the effect on weight gain, muscular endurance and strength, stamina, cardio-respiratory efficiency and reaction time.

OBSERVATIONS AND RESULTS

Total 72 cases registered for the study were randomly divided into two groups. Group A comprising of 38 and Group B of 34 students. Eight from Group A and four from Group B discontinued the trial. The observations are presented in tabulated form.

- The data was analyzed using Online InStatGraphPad.
- As the assessment criteria has all parametric values, paired 't' Test was used and results are calculated in each group to study the efficacy separately in each group.
- For the inter group comparison unpaired 't' Test was used.

Table 2: Effects of Vidarikandadi Yog and placebo

Variables	Vidarikandadi Yog (n = 30)			Placebo (n = 30)			P
	Before	After	Mean diff (SD)	Before	After	Mean diff (SD)	
Anthropometric							
Body wt. (kg)	39.2	39.46	0.26 (0.38)	39.95	40.06	0.11 (0.22)	<0.05*
Height (cm)	155.4	155.5	0.036 (0.08)	154.5	154.6	0.026 (0.63)	>0.05
C.C. (cm)	71.61	71.68	0.07 (0.14)	71.33	71.35	0.016 (0.09)	<0.05 *
M.A.C (cm)	19.75	19.80	0.056 (0.11)	20.35	20.38	0.023 (0.09)	<0.05*
M.T.C. (cm)	37.08	37.13	0.046 (0.09)	38.46	38.5	0.033 (0.12)	>0.05
Muscular strength and endurance							
PUT	15.13	17.86	2.73 (1.96)	15.00	15.63	0.76 (1.45)	<0.001*
SUT	21.1	24.43	3.33 (1.95)	22.76	21.83	0.93 (2.18)	<0.001*
HGST	17.93	20.2	2.26 (1.87)	17.43	18.06	0.63 (1.44)	<0.001*
Reaction time assessment							
RDT	20.50	17.72	2.77 (1.86)	22.15	19.77	2.37 (4.66)	>0.05
Cardio- respiratory assessment							
RHR	85.13	82.20	2.93 (3.18)	84.36	82.80	1.26 (2.54)	<0.05*
RRR	21.06	18.83	2.23 (1.99)	20.53	19.33	1.16 (2.79)	<0.05*
HST	82.56	85.23	2.26 (2.07)	82.63	83.40	0.76 (2.80)	<0.05*

CC = Chest circumference; MAC = Mid arm circumference, M.T.C. = Mid thigh circumference; PUT = Push ups test, SUT = Sit Ups Test, HGST = Hand grip strength test; RDT = ruler drop test; RHR = Resting heart rate; RRR = Resting respiratory rate; HST = Harvard step test. * = significant difference

INTER-GROUP COMPARISON

To assess the efficacy of two therapies, intergroup comparison was done. As, the assessment is based on parametric data, we used unpaired 't' test. Table 2 presents comparisons between test drug and placebo.

DISCUSSION

In present study, for weight statistically highly significant ($P < 0.001$) difference was observed in *Vidarikandadi Yog*, whereas significant ($P < 0.05$) result was obtained in placebo. For chest circumference, in *Vidarikandadi Yog* significant ($P < 0.05$) results were obtained and in placebo, there was no significant difference. Significant ($P < 0.05$) difference was noted in *Vidarikandadi Yog* for mid-arm circumference. In *Vidarikandadi Yog*, significant ($P < 0.05$) results were obtained for mid-thigh circumference, whereas placebo group showed non-significant ($P > 0.05$) difference. [Table 2].

Intergroup comparison of *Vidarikandadi Yog* over placebo showed statistically significant results for weight and chest circumference. On the other hand, the difference was non-significant for height, mid-arm circumference, and mid-thigh circumference.

For Push-Up Test, highly significant ($P < 0.001$) results were obtained for *Vidarikandadi Yog* and significant ($P < 0.05$) results for Placebo. In the same way for Sit-Up Test highly significant ($P < 0.001$) results were obtained for *Vidarikandadi Yog* and significant ($P < 0.05$) results were

obtained for placebo. For Hand Grip Strength Test, statistically highly significant ($P < 0.001$) results were obtained for *Vidarikandadi Yog* and significant ($P < 0.05$) results were obtained for placebo.

Intergroup comparison of *Vidarikandadi Yog* over placebo showed statistically highly significant results for all the three tests [Table 2].

For Ruler Drop Test, statistically highly significant ($P < 0.001$) results were found for *Vidarikandadi Yog* and significant ($P < 0.05$) results for placebo separately.

Results of intergroup comparison between *Vidarikandadi Yog* and placebo showed statistically non-significant results.

For Resting Heart Rate (RHR) and Resting Respiratory Rate (RRR), statistically highly significant ($P < 0.001$) differences were found in *Vidarikandadi Yog*, whereas non-significant difference in placebo. For Harvard Step Test (HST), highly significant ($P < 0.001$) results were found in *Vidarikandadi Yog* and non-significant ($P > 0.05$) results were found in placebo.

By intergroup comparison of *Vidarikandadi Yog* over placebo, significant results were found in all the three variables i.e., RHR, RRR, and HST [Table 2].

The drug *Vidarikandadi Yog* has three ingredients viz. *Vidarikanda*, *Godhuma*, and *Yava*. All the drugs are of *Madhura* rasa except that of *Yava* having both *Madhura* and *Kashaya* rasa. Guru property is evident in all the three drugs, whereas *snigdha* property is mentioned for *Vidarikanda*

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and *Godhuma*, and *Yava* is having *Ruksha* property. All the three drugs are of *Sheeta Virya*. Vipaka of *Vidarikanda* and *Godhuma* is *Madhura* and that of *Yava* is *Katu* in nature.

All the components of *Vidarikandadi Yog* are of *Balya*, *Brinhana*, *Jivaniya*, *Rasayana*^[5] (*Vidarikanda*), *Santarpan*^[6] (*Godhuma*), and *Sthairyakrita*^[7] (*Yava*) property. As far as *Doshagnata* is considered *Vidarikanda* and *Godhuma* are *Vatapittahara*, whereas *Yava* is *Pittakaphahara*.^[8]

Classical indications suggests their use in *Kshaya*^[9] (Wasting), *Shosha* (Emaciation), *Daurbalya*^[10] (Debility), *Sthairyakrita*^[11] (Stabilizing) etc.

Ayurveda holds the concept of *Brinhana* for overall growth of the body and potentiating the strength, energy and endurance in the healthy individuals. Hence, this drug was selected to enhance the physical strength and sport performance of children.

Almost all the drugs are of *madhura* rasa. *Madhura* rasa being *prithvi-jala mahabhuta* predominant is basic element for physical growth of body and is *Prinana*, *Jivana*, *Tarpana* and *Brinhana*.^[12] Due to these actions, drug has better role in enhancing the physical strength of the body. Moreover, it is considered as *Dhatuwardhana* by *Susbruta*.^[13] This property of *madhura* rasa has probably worked on all the *dhatus* their nutrition and there by formation of *sarabhuta Ojas*, which is considered as the symbol of essence of all the *dhatus*. This *Ojas* is, thus, responsible for enriching the energy stores and stamina of body. This particular rasa is considered as *Ajanmyasatmya*^[14] at all stages of life, hence the ingredients of this compound might have been well tolerated by the children included in the trial.

The *Guru guna* present in drug by its *Tarapana* and *Brimhana* actions increases the mass of body tissues.^[15] *Guru* properties are directly related to the physical growth. The *Snigdha guna* alleviates *Rukshata* and *Kharata* of *dhatus* by its *Snehana* and *Mridukarana* properties.^[16] Both the properties help to nourish *deha dhatus* which are in *Vivardhamana* stage in children and help to promote the *bala* (physical strength) in the body.

Madhura vipaka of *dravyas* is added benefit for their action as a *Brinhana* drug. *Madhura Vipaka* like *Madhura rasa* is *Sarvabhuta poshaka*, *Balya*, *Brimhana*, *Jeenviya*, *Prinana*, *Sthairyakara* and by these properties, it helps in the formation of new body tissues and nourishes old one. *Yava* is having *Katu Vipaka*. *Katu vipaka* increases the overall metabolism in the body and help in absorption of micro and macro nutrients, therefore, it minimizes the nutrient deficiencies and stimulates growth of healthy tissues and enriches the energy stores.

The *Sheeta Veerya* is favorable in childhood by its *Mridu*,

Balya Brinhana, and *Rasayana* action on *dhatus*. *Virya* implies the ultimate mode of energy or *shakti*. It is described as the capacity or power to perform work or action present potentially in *dravyas*. These are classified as *Sheeta* and *Ushna* corresponding to kinetic and potential energy respectively.^[17] As all the components of formulation has *sheeta virya*, they form the ultimate source of potential energy in the body.

The major ingredients of the drug i.e., *Vidarikanda* and *Godhuma* are *Vatapittabar* and *Kaphakerita*. *Vata Dosha* is responsible for decrease of strength in the body. By correcting *Vata* this drug can help in increasing of *Sharira Bala* (strength of muscles). *Pittabar* action of drug implies the correction of *Agni vikriti* (digestive fire), *Pachan* (digestion and metabolism), and *Amatratvatushmana* (the impairment of production of heat).^[18] This particular action of drug helps to strengthen the process of digestion and metabolism and there by the process of energy production. Also, *Vyayama* or exercise is supposed to increase *Vata* and *Pitta* both, hence the drug selected has better action as they have *Vatapittabar* action.

All the drugs are *Balya*, *Brinhana*, *Jivaniya*, *Rasayana* (*Vidarikanda*), *Santarpan* (*Godhuma*), and *Sthairyakrita* (*Yava*). *Balya* drugs provide the revitalizing strength to the body. *Brinhana* effect of the drug increases the production of healthy *dhatus* in the body. *Rasayana* drugs are supposed to increase all the *sharira dhatus*, both qualitatively and quantitatively strengthening the body. *Santarpan* property helps in increasing the strength and weight of the body. *Sthairyakara* is beneficial to provide firmness to the body.

The various action and effects of the drug can be explained on modern parameters as well by recent studies of their pharmacological actions.

Vidarikanda possesses growth hormone inducing^[19] and nootropic properties. By induction of growth hormone *Vidarikanda* may promote weight gain and physical strength of the body. The research on *Vidarikanda* suggest significant anxiolytic and anti-stress properties of *Pueraria tuberosa* extract (PTE), confirming the clinical efficacy of the plant mentioned in *Ayurveda*.^[20]

Adaptogenic activity of *Vidarikanda* proves its utility in tolerating the stress produced as a result of physical and mental exertion.^[21] Apart from above potential *Vidarikanda* has immunomodulatory and anti-oxidant properties too. These properties of drug has additional benefit in keeping the individual's fitness to the optimum level.^[22]

The wheat contains several medicinal virtues. Every part of the whole wheat grain supplies elements needed by the human body. Starch and gluten in wheat provides heat and energy. The germ, vitamins B and E, protein of wheat helps

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build and repair muscular tissues. Thus, wheat acts as a body building agent.^[23] The wheat germ contains riboflavin, thiamine, vitamin E, and trace minerals such as zinc, copper, iron, and magnesium. Wheat is the best nourishing food that can be easily given to patients and even babies.^[24] The B-complex vitamins, especially thiamine, riboflavin, and niacin offered by natural brown Wheat promote youthful energy and nourishment to skin and blood vessels.^[24]

Barley or *Yava* has proven effect that it is good source of energy and maintains the energy stores for long time as compared to wheat and rice.^[25] The study conducted on various strains of Barley concluded that it has anti-oxidant property and its immunomodulatory property has also been evaluated.^[26]

Thus, it can be said that effect of all the ingredients of the study drug "*Vidarikandadi Yog I*" was due to the growth hormone inducing, nootropic, anxiolytic, and anti-stress, adaptogenic, immunomodulatory, and anti-oxidant properties of *Vidarikanda* and other properties of *Goduma* and *Yava*.

Probable mode of action of placebo

Placebo comprised of simple sugar having same color. Though, it has *Madhura Rasa, Guru, and Snigdha guna*, etc., properties but the administered dose was so small that cannot cause potentiating effect on physical strength and endurance.

CONCLUSIONS

Vidarikandadi Yog I (Trial Drug) have greater potential in enhancing the sport performance (Body composition, Cardio-respiratory, and Muscular strength) of individuals included in the trial. No adverse effects of the drug were observed during the study. This indicates the safety profile of the study drug.

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