

A Single Case Study on Ayurvedic Therapeutic Management for Increasing Growth Hormone in Pre-Pubertal Girl

Ankita Patel^{1*}, Das Ashokkumar Nathulal², Haresh Vyas³

Abstract

Human growth hormone, commonly referred to as HGH and somatotropin, is a naturally occurring hormone released by the pituitary gland that promotes growth in children by acting on various body regions. The pituitary gland produces the polypeptide hormone known as human growth hormone (hGH), or somatotropin, which is made up of 191 amino acids. A lack of human growth hormone (hGH) in children can result in growth failure, low stature development, and delayed sexual maturity. GH is also physiologically significant in adults. A patient was suffering from not gain the height as per the age, passing hard stool, anorexia, improper speech, angry and increased frequency of urination at night add the symptoms after taking growth hormone and insulin like growth hormone injection. Given Ayurvedic medicine Yashad Bhasma, Shitopladi, Ashwagandha, Ajasthi Bhasma and Loha Rasayana by that patient was benefited in symptomatic complaints with normal bone age x-ray, stopped the growth hormone injection and reduced the dose of thyronorm.

Keywords: Ajasthi Bhasma, Ashwagandha, Shitopladi, Loha Rasayana, Yashad Bhasma

INTRODUCTION

A person's height as an adult is determined by their parents' DNA, as well as their overall health and diet during their formative years. Compared to children of tall parents, children of short parents are more likely to be short themselves. There is a great deal of variance; siblings of the same parents may not all grow up to be the same height, and parents may unintentionally have a child that is remarkably tall or short compared to the rest of the family. youngsters may not grow to their full adult height if they suffer from illnesses, eat poorly as youngsters, or are born tiny or prematurely.

The height we achieve is mostly due to genetic factors. Height is a multifaceted characteristic that is impacted by both parents' DNA. It's crucial to remember that different people have different genetic potential and that other circumstances can affect whether a person reaches their full height potential.[1]

Children's bone and tissue growth is stimulated by the hormone growth hormone (GH). Growth, puberty, and the possibility of breast development in prepubertal girls can all be impacted by GH levels. Insufficient production of growth hormone by the pituitary gland results in growth hormone deficit (GHD). A child's slower-than-expected height growth is the primary indicator of GHD. Children with GHD may also have a plump

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body and a younger-looking face. During puberty, when a child's growth velocity peaks, GH secretion rises. Early peak height velocity, lengthier puberty, and earlier breast development are all associated with higher GH levels. Additionally, GH can trigger the release of reproductive hormones and puberty [2].

One of the most frequent reasons for referring a child to a paediatric endocrinologist is short height. Height that is more than two standard deviation scores (SDS) below the matching mean height for a specific age, gender, and population group is referred to as this condition. Even though some children's causes of low stature have been determined, many of these youngsters are still classified as having idiopathic short stature (ISS) since they have not received a conclusive diagnosis. Thus, at the conclusion of the diagnostic evaluation, ISS can be identified after ruling out the presence of systemic, endocrine, nutritional, or chromosomal problems. ISS is a diverse group of children with a variety of unknown causes of short stature, including genetic disorders involving gene mutations for molecules involved in growth at any level, such as bio-inactive growth hormone (GH), partial GH insensitivity, GH receptor signalling defects, mutations of the insulin-like growth factor (IGF)-I or IGF-I receptor, short stature homeobox-containing gene (SHOX) haploinsufficiency, and constitutional delays. Between 60 and 80 percent of all short children are thought to have an ISS-confirming diagnosis [3].

Physiologic regulation of GH secretion has been an active subject of investigation recently. In particular, the interaction with, and independent functions of, the sex steroid hormones and GH have been the subjects of a large number of studies, both in the basic sciences and in the clinical arena. Based on the results of multiple clinical studies, it has been observed that GH secretion is amplified in the presence of gonadal steroid hormones. During the course of male and female puberty, either normal, precocious, or pharmacologically induced, spontaneously circulating GH levels increase via an amplitude-modulated phenomenon. Using recently available mathematical modeling techniques, it has been possible to demonstrate that the mechanism of this increase is via sex steroid hormone-induced amplification of endogenous GH production rate, without demonstrable alterations of the frequency of secretory episodes or of hormone half-life.

Pituitary-derived hGH has been used since the 1950s. Since recombinant human growth hormone (rhGH) became available in 1985, more patients can now be treated for a greater variety of growth problems. Children with Turner syndrome (TS), chronic renal failure (CRF), idiopathic short stature, and small for gestational age (SGA) who do not exhibit catch-up growth can all benefit from rhGH. It is also used to treat growth hormone deficiency (GHD) in both adults and children [4]

For a youngster with short stature, growth hormone (GH) treatment can have significant consequences. The youngster may be freed from social or psychological responsibilities related to low stature in addition to growing taller towards a normal height. The child's emotions of wellbeing and self-worth, as well as its views towards its height and internalised and expressed behaviours, are likely to change as a result of being freed from these constraints. Even though height gain is frequently the main result of GH treatment, it can also be interpreted as a sign of a person's social and psychological changes. When GH dosing is based on estimated individual responsiveness to GH, there is evidence that children with idiopathic short stature (ISS) and children with GH deficiency (GHD) do not significantly differ in height gain after GH treatment. There are additional GH-related advantages for short children in addition to the well-known dose-dependent effect on growth in GHD, which is also present in ISS children. Short children taking GH have been reported to have better energy levels, cognitive abilities, and quality of life (QoL), which is characterised as gains in wellbeing and self-esteem, compared to prior treatment. These groups comprise ISS, ISS/GH-deficient children, and short children born small for gestational age (SGA). Compared to a reference population, small children have been found to have worse academic ability, poorer self-esteem, and poorer concentration at baseline (BL). Children that are short have been shown to experience dissatisfaction with their height, which can result in poor psychological adaption [5].

About Case

A female patient, with age of 8 years, from Ahmedabad, Gujarat, consulted to Ayurveda Chikitsa Mandir and Panchkarma Research Centre in November 2021 with chief complaints such as not gain the height as per the age, passing hard stool, angry, anorexia, improper speech, increased frequency of urination at night, and diagnosed case of autoimmune thyroid with raised anti TPO since 2017.

- *Antinatal History:* During pregnancy mother had weakness & too much consumption of street food
- *Birth History:* Full Term Normal Vaginal Delivery.
- *Birth Weight:* 3.0 k.g.
- *Immunization History:* Achieved as per the IAP schedule.
- *Past History:* At the age of 2.5 year operated for head injury

Her investigation on 2017 (As shown in table no.1).

Anti TG	Anti TPO
500 >	327

Table 1. Blood Investigation.

Medicine History

- Injection of growth hormone SC
- Tab thyronorm 75 mcg 1 od

Before started treatment CBC, ESR, AEC, T₃, T₄, TSH, Anti TPO, Anti TG, Insulin, HbA_{1c} and stool test on date 21/11/2021(As shown in table no.2).

Test	Result
Hb:	9.5gm/dl
TRBC	4.80 million/cmm
P.C.V	30.5%
M.C.V	63.6Pg
M.C.H	31.2%
TWBC	5210 /cumm
D.C	34%/54%/7%/5%/0%
A.E.C	385 cells/ μ L
T3	0.93ng/dl
T4	8.17ng/dl
TSH	5.65 μ IU/mL
Anti TG	98.74 IU/mL
Anti TPO	14.37 IU/mL
Insulin	2.2
GH	1.21ng/mL

Table 2. Investigations.

Stool Examination-NAD

On Examination

- Weight:19.80kg.
- Height:117 cm.

Samprapati

- Dosha- Tridoshaja Vyadhi,
- Dushya-Rasa,Rakta, Mamasa, Meda, Asthi
- Agni-Jatharagni, Dhatvagni,
- Srotas- Rasavaha, Raktavaha, Mamsavaha, Medavaha, Asthivaha

- *Srotodushti-Sanga,*
- *Vyadhiudbhavasthana-Pakvashaya*

Treatment Protocol

Medicines (Table 3) were given for approx 2 year and during this period patient was advised to take *PathyaAhara-Vihara*.

Medication	Dose	Anupana	Time
<i>YashadBhasma</i> 100mg.+ <i>Shitopladi</i> 500mg	600mg.od	<i>Madhu</i>	<i>Nisha kale</i>
<i>Ashwagandha</i> 1 gm.+ <i>Ajasthi Bhasma</i> 100mg.	1100mg.od	<i>Ushnodak</i>	<i>BhojanPachhata</i>
<i>Loha Rasayana</i>	125 mg.od	<i>Ghrita</i>	<i>Pratah Kale</i> 10:00am

Table 3. Medications.

Observation and Results

Before started treatment, patient was suffering from not gain the height as per the age, passing hard stool, angry, anorexia, improper speech, increased frequency of urination at night,

After consultation and assessed patient symptoms at interval of 10 days firstly with *Ayurvedic* medicines. Patient showed relief during follow up and improvement in symptoms such as gradually increase the height and gain the weight;gradually improve in appetite, normal stool frequency, decreased frequency of urination at night, (As shown in table no 4) & Blood Investigation in table 5. During the course there was stop growth hormone injection.

Date	23/11/2021	20/01/2022	14/04/2022	08/08/2022	13/10/2023
<i>Agnimandhya</i>	++	++	+	-	-
<i>VibandhvtaMalapravriti</i>	++	3 to 4 time/day <i>Durgandhita</i> <i>Drava</i>	1 time/day	1 time/day	1 time/day
<i>Krodhanubhuti</i>	++	+	-	-	-
Wt(kg)	19.80	20.80	22.40	21.20	24.21
Height(cm.)	117	118.2	120.5	122	128.7

Table 4. Assessment of the symptoms.

Date	21/11/2021	20/01/2022	08/08/2022	10/03/2023	14/03/2023	14/07/2023
Hb	9.5gm/dl	-	-	10.7 gm/dl	-	10.5 gm/dl
TRBC	4.80 million/cmm	-	-	5.14 million/cmm	-	5.00 million/cmm
PCV	30.5 %	-	-	33.2%	-	32%
TWBC	5210 /cumm	-	-	-	-	4790/cumm
TSH	5.65µIU/mL	3.0469 µIU/mL	0.0588 µIU/mL	-	5.57 µIU/mL	-
FT ₄	8.17ng/dl	1.31ng/dl	1.4 ng/dl	-	-	-

Table 5. Blood Investigations.

Interpretation: - there is no epiphysial fusion till date, so there is a chances of increase in height (Figure 1).

Discussion

Probable Mode of Action of *Yashad Bhasma* and *Shitopladi*

Yashad (Jasad) Bhasma is an immunomodulatory, mineral-based Ayurvedic medication. It is also a zinc supplement used in Ayurveda[6]

When GH-releasing hormones are stimulated, GH is quickly released from concentrated forms stored in secretory granules. GH self-association takes place in the early secretory pathway compartments during the secretory granule formation phase. Understanding the possible function of zinc transporters that take part in the fine-tuning of zinc homeostasis and dynamics, especially in the early secretory route, is crucial because the presence of zinc ions considerably facilitates this process. Therefore, proper secretion depends on zinc transporters providing the secretory pathway with the adequate quantity of zinc needed for the formation of GH-containing secretory granules [78]



Figure 1. Bone age x-ray on date 25/04/2024.

Probable Mode of Action of *Ashwagandha* and *Ajasthi Bhasma*:

Extracts from *Ashwagandha* encouraged chondrocytes, the cells that make bones, to proliferate and differentiate. This implies that ashwagandha can potentially affect human growth plates as well, which would ultimately affect height development. Extracts from *Ashwagandha* can boost bone mineral density and calcium absorption, which may improve the potential for height development [9].

As the *bhasmas* particle size reached nanoparticles, it may be presumed that nanoparticles improve drug efficacy, transport medication to the body, accurately identify diseased cells and require a lower dosage, and lessen adverse effects. (On concept of *sarvadasarvabhavanamasanyamvrddhikaranam*).

Probable Mode of Action of *Loha Rasayana*

Hepatocytes are hypoxic due to anaemia, which prevents the synthesis of proteins. Low oxygen levels in vitro prevent the action of insulin-like growth factor-I (IGF-I) by raising IGF binding protein-1 (IGFBP-1), particularly phosphorylated IGFBP-1, which prevents the action of IGF-I.[10]

Tapyadi Loha mainly acts on *Rakta Dhatu* which leads to *Raktadhatwagnivardhaka & Balya* and also accelerates circulation of blood by giving nutrition to blood components.[9]

CONCLUSION

The main factor influencing height growth is genetics, but there is growing interest in looking into natural treatments that might maximize height growth potential. *Ashwagandha*, with its potential impact on growth plates, growth hormone secretion, and bone development, offers a promising avenue for further research. However, it's important to approach *Ashwagandha* as a supplementary measure and consider overall health and lifestyle factors that contribute to height growth. Hence, this single case study to prove the efficacy of drugs and should be evaluated on large sample size of patients for its scientific validation.

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