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REVIEW ARTICLE **OPEN ACCESS**

A Literary Review on Bala Shosha W.S.R. PEM

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ABSTRACT

Bala Shosha is a common condition affecting most of the children. Bala Shosha is made up of two words 'Bala' and 'Shosha' means emaciation of child. Bala Shosha is due to kshaya of all seven Dhatus. Aruchi, Pratishyaya, Shukla netra etc are their clinical symptoms. On the basis of clinical features, basic cause and basic treatment principle,Bala Shosha can be correlated with PEM. Children with primary PEM are generally found in developing countries as a result of inadequate food supply caused by socio-economic, political and occasionally environmental factor such as natural disaster. According to United Nation Children's fund (UNICEF), PEM is an invisible emergency much like the tip of an iceberg, where its deadly consequences are hidden from view. So it is necessary to diagnose and treat PEM quickly. There are many treatment modalities available in Ashtang Hridaya and Ashtang Sangrahya like Shishushosha nasak Ghrita and Shoshanasak Taila.

Keywords: *Bala Shosha , PEM, Shosha, Krusha, Daurbalya, Karshyaroga*

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INTRODUCTION

Nutrition is major concern of the mankind. Abnormal nutrition cause over or under nutrition hazards, among them nutrition deficiency disorder is one. *Balashosha* is result of improper nutrition. The disease *Balashosha* is only described by *Acharya Vagbhatta* in his books *Astangasangraha* and *Astangahridaya*. Other *Acharya* like *Charak* and *Sushruta* discussed the term '*Shosha*' and '*Krusha'*, *Sharangadhara* named it '*Gatrashosha*' and '*Dourbalya*' and *Yogaratnakara* termed it '*Karshyaroga*' etc [1,2]. Similarlythe causes and symptoms of *Parigarbhika, Shuskarevati, Ksheeralasaka* and *Phakka roga* also resemble the *Balashosha*. *Balashosha* limits only to child age group. Pathology of development of *Bala Shosha* is almost similar to Protein Energy Malnutrition (PEM). WHO defined PEM as range of pathological conditions arising from coincidental lack in varying proportions of protein and calories, occurring most frequently in infants and young children and commonly associated with infection. There is a varying extent of weight loss and growth retardation with the severity of PEM i.e. in the early stages; there is loss of weight associated with loss of subcutaneous fat and muscle mass with dysfunction of many vital organs which lead to a variety of clinical features with increasing severity, there is increasing failure in the homeostatic mechanisms of the body and damage to the immune defense which may result in infections, shock and death.

ETIOLOGY

According to *Acharyas*

- Excessive sleeping during day.
- Drinking ice cold water.
- Drinking breast milk vitiated by *Shleshma (Kapha)*.

According to modern point of view [3]

- Bad economy – Poor socio- economic status, illiteracy etc.
- Low income that can't provide thee nutritional diet.
- Faulty methods of feeding, many deep rooted beliefs like semisolid food should be given only after 6 months, solid foods should be given only after *Anna Prashana*.
- Ignorance – Neglected breast feeding, artificial feeding, dirty formula feed, hypo or hyper diluted milk formulas, early weaning from the breast.
- Medical reasons like infections, diarrheal episodes, malaria, measles, worm infections etc.
- Inadequate medical facilities.
- Maternal malnutrition.

- Working mother.
- Secondary malnutrition due to tuberculosis, diabetes, metabolic disorders, Intestinal malabsorption.

CLASSIFICATION [4]

PEM is a generalized syndrome complains. It is classified according to the severity, course and relative contribution of energy or protein deficit causing anthropometric clinical and biochemical parameters.

Table 1. WHO classification

Nutritional Status	Body weight as % standard for age	Edema	Deficit in weight for height
Under weight	80-60	0	Minimal
Nutritional dwarfism	<60	0	Minimal
Marasmus	<60	0	++
Kwashiorkor	80-60	+/++	+/++
Marasmic Kwashiorkor	<60	+	++

Table 2. IAP classifiation

Nutritional Grade	% of standard weight for age
Normal	>80%
Grade 1	71-80%
Grade 2	61-70%
Grade 3	51-60%
Grade 4	<50%

Table 3. Classification based on NCHS standard

Indices	Nomenclature for deficit of India	Cut off defining % of reference median	Points for malnutrition on Z or SD score from reference median
Weight for age	Underweight	<80	<-2
Height for age	Stunting	<90	<-2
Weight for height	Wasting	<80	<-2

Table 4. Gomez's classification

Weight of the child	Grade
90-110% of standard	Normal
75-90% of standard	1st degree malnutrition (mild)
60-74% of standard	2nd degree malnutrition (moderate)
Less than 60% of standard	3rd degree malnutrition (severe)

Table 5. Jellife's classification

Nutritional Grade age (50th percentile of Harvard standard)	Percentage of standard weight for
Normal	>90 %
Grade 1	80-90 %
Grade 2	70-79 %
Grade 3	60-69 %
Grade 4	< 60 %

Syndromal classification

- Kwashiorkor
- Nutritional Marasmus
- Marasmic Kwashiorkor
- Pre – Kwashiorkor
- Nutritional Dwarfism

PATHOGENESIS [5]

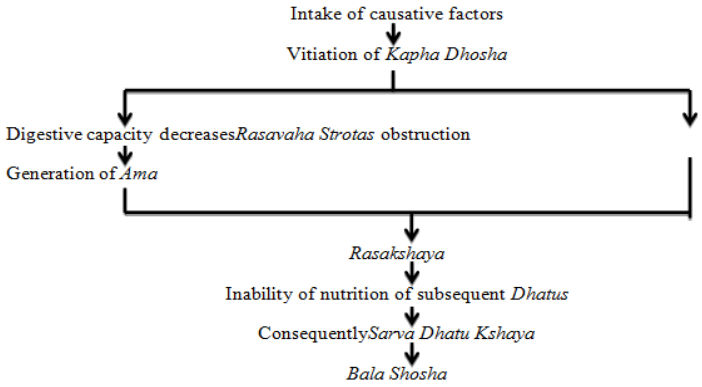

Figure 1. Pathogenesis pathway

Due to intake of causative factors, there is vitiation of *Kapha Dosha* whichslows down the pitta or bile production and decreases the digestive capacity (Figure 1). This leads to the generation of *Ama Rasa*whichcauses *Rasakshaya.* On the other hand, vitiated*Kapha* obstruct the channels especially the *Rasavaha Strotas* resulting in *Dhatukshayam* which will be clinically expressed as *Shosha*.

According to modern point of view:

Gopalan's theory of adaptation

Some children develop marasmus while other develops Kwashiorkor even though there is no quantitative and qualitative difference in their diet. This is explained by the Gopalan's theory which says that marasmus develops due to good adaptation to poor diet while Kwashiorkor is the result of adaptation failure. In marasmus, decreased calorie intake leads to decreased insulin levels and increased cortisol levels. Increased cortisol level leads to tissue catabolism, which causes muscle wasting. In this process, glucose and amino acids are released into the circulation. The glucose is utilized by the brain and the amino acids are used for synthesis of albumin and beta-lipoprotein. Thus albumin level is maintained in the blood and hence no edema occurs in marasmus. The beta-lipoprotein helps in mobilizing the fat from the liver; hence, the fat is not accumulated in the liver. In Kwashiorkor, there is increase in insulin level which prevents tissue catabolism. Hence, the amino acids are not available for albumin synthesis and beta-lipoprotein are not formed. Hence, edema and fatty liver develop.

CLINICAL FEATURES

- Emaciation of body
- Loss of taste/appetite
- Nasal catarrah, fever, cough etc.

Symptoms of *Bala Shosha*according to *Ashtang Hridaya[6]* and *Ashtang Sangrahya[7]:*

- *Arochaka*
- *Pratishyaya*
- *Jwara*
- *Kasa*
- *Shosha*
- *Snigdha mukha*
- *Snigdha netra*
- *Sukla mukha*
- *Sukla netra*

PEM NEEDS TO DIFFERENTLY DIAGNOSE FROM:-

- ✓ Kwashiorkor
- ✓ Marasmus
- ✓ Protein losing enteropathy
- ✓ Anasarca
- ✓ HIV wasting syndrome
- ✓ Chronic pancreatitis
- ✓ Pediatric nephrotic syndrome.

Table 6. Difference between kwashiorkor and marasmus

Distinguishing Features	Kwashiorkor	Marasmus
Causes	Deficiency of protein	Deficiency of protein as well as energy nutrients
Age	1-5 years	Below 1 year
Association	More common in villages where there is small gap period between successive pregnancies	More common in towns and cities where breast feeding in discontinued quite early
Edema	Presence of edema.	Absence of edema
Muscles	Wasting of muscles	Wasting of muscles is quite evident. The child is reduced to skin and bones
Skin changes	Dermatitis and hyperpigmentation noticed	Dry and atrophic skin but no changes in color
Serum cortisol	Decreased / Normal	Increased
Fasting blood glucose	Decreased	Decreased
Growth retardation	Mildly retarded in growth	Severely retarded in growth
Facial appearance	Moon like face	Sunken eyes, maxillary prominence, loss of buccal fat pad
Abdomen	Protruded	Shrunken
Vitamin deficiency	Present	Present
Weight	60 – 80 % of normal weight for age	<60% of normal weight for age

MANAGEMENT

The principle of treatment of *Bala Shosha* is as follows:

- To relieve obstruction of *Strotas* by administering *Shodhana Dravya.*
- To stimulate *Agni.*
- Use of *Brimhana Drugs*

According to *Acharya* –

1) According to *Ashtangahridaya[8]* and *Ashtangasangrahya[9]*, powder of *Saindhava, Vyosh(Trikatu), Sharngeshta, Patha* and *Girikadamba*, mixed with honey and ghee should be given to the emaciated child having loss of taste.
    - ***Saindhava lavana***
      Tridoshashamak, Rochana, Deepana.
      Uses - In *Aruchi, Ajeerna* etc.
    - ***Vyosh* or *Trikatu***
      Pippali, Sunthi, Maricha.

Table 7. Dravya used for Treatment of Balashosha

DRAVYA	**Pippali** [10]	**Sunthi** [11]	**Maricha** [12]	**Sharngeshta** [13]	**Patha** [14]	**Kadamba** [15]
BOTANICAL NAME	Piper longum	Zingiber officinalis	Piper nigrum	Clerondendron serratum	Caessempelus pareira	Anthocephalus indicus
FAMILY	Piperaceae	Zingiberaceae	Piperaceae	Verbenaceae	Menispermaceae	Rubiaceace
GUNA	*Laghu, snigdha, tikshna*	*Laghu, snigdha*	*Laghu, tikshna*	*Laghu, ruksha*	*Laghu, tikshna*	*Laghu, ruksha*
RASA	*Katu*	*Katu*	*Katu*	*Laghu, ruksha*	*Tikta*	*Katu, kashay, tikta*
VIPAK	*Madhur*	*Madhur*	-	*Katu*	*Katu*	*Katu*
VEERYA	*Anushnasheet*	*Ushna*	*Ushna*	*Ushna*	*Ushna*	*Sheeta*
DOSHA – KARMA	*Katu= kapha shamak Snigdha= vatashamak*	*Kapha- vata shamak*	*Vata – kapha shamak*	*Vata – kapha shamak*	*Triosha shamak especially kaphavata shamak*	*Tri -doshahar*
USES	Anorexia, loss of appetite, indigestion etc.	Anorexia, loss of appetite, indigestion, vomiting and flatulence	Anorexia, loss of appetite, indigestion etc.	Anorexia, loss of appetite and *Gulma*	Anorexia, indigestion, Abdominal pain, diarrhea and dysentry	Diarrhea, colitis, inflammation, vomiting
ACTIVE COSTITU-ENT	Piperine	6-gingerol	Piperine	Phenolics, flavonoids, terpenoids	Pelosine or Bebeerine	Cinchotannic acid, indole alkaloid
MODE OF ACTION	Act as bioavailability enhancer by improving gastro-intestinal absorption and inducing thermogenesis	Gingerol suppressed gastric contraction but increased gastro – intestinal motility and spontaneous peristalsis activity. Thus accelerate gastric emptying.	Act as bioavailability enhancer by improving gastro-intestinal absorption and inducing thermogen-esis	Ethanol extract of roots possess antibacterial, anti – inflammatory and anti-allergic activity. Alcoholic extractof root possess anti pyretic activity.	Ethanolic root extract showed anti-diarrheal and anti -ulcer activity. Hydro alcoholic root extract showed hepato-protective activity	Ethanolic extract of leaf and methanolic extract of bark showed analgesic and anti-inflammatory activity.Methanol extract also show gastro-protective activity.

Since these drugs are *Aruchi Shamk, Tridoshaghna, Deepana, Pachana*, hence used in emaciated child to improve their taste, digestion and metabolism.

2) According to *Ashtangahriaya[16]* and *Ashtangasangrahya[17]*, medicated ghee prepared with *Madhuk, Pippali, Lodhra, Padmaka, Utpala (kamal), Chandana, Talisha, Sariva* cures emaciation (Table 8 to 14).

Table 8. Madhuk (Yashtimadhu)[18]

Botanical name	Glycyrrhiza glabra
Family	Leguminoceae
Guna	*Guru, snigdha*
Rasa	*Madhur*
Vipak	*Madhur*
Veerya	*Sheeta*
Dosha	*Vata- pitta shamak*
Uses	Antiemetic, antidyspeptic and laxative. Also used in gastritis.
Active constituent	Glycyrrhizin
Mode of action	Glycyrrhizin enhance metabolism and also possess ulcer healing property.

Table 9. Lodhra [19]

Botanical name	Symplocos racemosa
Family	Symplocaceae
Guna	*Ruksha, laghu*
Rasa	*Kashaya*
Vipak	*Katu*
Veerya	*Sheeta*
Dosha – karma	*Kapha-pitta shamak*
Uses	Diarrhea, dysentery and tenasmus
Active constituent	Loturine, colloturine and loturidine.
Mode of action	Ethanolic extract showed antibacterial and hepatoprotective activity.

Table 10. Padmaka [20]

Botanical name	Prunus cerasoides
Family	Rosaceae
Guna	*Laghu, snigdha*
Rasa	*Kashaya, tikta*
Vipak	*Katu*
Veerya	*Sheeta*
Dosha – karma	*Tridoshahar*
Uses	Loss of appetite, laxity of stomach, vomiting etc
Active constituent	Flavonoids, diterpenes and cardiac glycosides.
Mode of action	Ethanolic extrat showed anti- bacterial activity

Table 11. Utpala (Kamala) [21]

Botanical name	Nelumbo nucifera activity
Family	Nymphaceae
Guna	*Laghu, Snigdha, Pichchila*
Rasa	*Madhura, Kashaya, Tikta*
Vipak	*Madhura*
Veerya	*Sheeta*
Dosha – karma	*Kapha-pitta Shamak and Balya*
Uses	Vomiting, diarrhea, weakness of children
Active constituent	Nuciferine and N – Nornuciferine
Mode of action	Ethanol extract showed anti- pyretic, anti- inflammatory and hepatoprotective activity. Flavonoids showed anti -obesity activity. Rhizomes have high nutritional value.

Table 12. Chandana [22]

Botanical name	Santalum alba
Family	Santalaceae
Guna	*Laghu, Ruksha*
Rasa	*Tikta, Madhur*
Vipak	*Katu*
Veerya	*Sheeta*
Dosha – karma	*Kapha-pitta Shamak*
Uses	Digestive problems,Diarrhea caused by pitta and dysentery
Active constituent	Alpha and Beta santalol, bergamatols
Mode of action	Alpha and Beta santalol and methanol extract has anti- bacterial activity. Sandalewood oil has anti-pyretic effect. Santalol showed anti-inflammatory activity.

Table 13. Talees [23]

Botanical name	Abies webbiana
Family	Pinaceae
Guna	*Laghu, Tikshna*
Rasa	*Tikta*
Vipak	*Madhur*
Veerya	*Ushna*
Dosha – karma	*Kapha-vata Shamak*
Uses	Anorexia, loss of appetite, flatulence and *Shosha*
Active constituent	Flavonoids, tannins, saponins and quinones etc.
Mode of action	Tannins an sterols have anti- bacterial,anti- fungal, analgesic and anti-inflammatory activity. Flavonoids have anti- fatigue, anti- hyperlipidemic activity.

Table 14. Sariva [24]

Botanical name	Hemidesmus indicus
Family	Asclepiadaceae
Guna	*Guru, Snigdha*
Rasa	*Madhura, Tikta*
Vipak	*Madhur*
Veerya	*Sheeta*
Dosha – karma	*Tridosha Shamak*
Uses	Loss of appetite, diarrhea, dysentery and malena
Active constituent	Terpenoids, ,benzoids, pregnane glycosides etc
Mode of action	Ethylacetate root extract have anti- inflammatory activity. Hydroalcoholic extract have anti- pyretic activity. Methanolic root extract showed anti- diarrhoeal activity

Ghrita:

- *Agni – Vardhak, Oja, Kapha and Meda Vardhak.*
- *Vata-pitta Nashak.*
- *Rajyakshama Nashak*.

3) *Abhyanga* with *Lakshadi taila*. It is best for *Kshaya, Jwara, Unmada, Swasa, Apasmara* and *Vata Nashak[25].*

According to modern point of view, management of PEM depends on:-

- Nutritional status
- Degree of hypermetabolism
- Expected duration of illness
- Associated complications

Mild to moderate PEM is best managed at home. Majority of cases of severe PEM are associated with some compilations and hence be best managed in hospital.

DISCUSSION

After literary study of *Bala Shosha* and PEM, both can be correlated with each other. Considering the causes, the general causes of both the diseases varies but basic cause of both diseases is same that is nutritional deficiency. Also considering the sign and symptoms, it is found that the main symptom of both the disease is emaciation due to improper weight gain. Recurrent systemic infections of PEM mainly respiratory tract infections can be compared with *Pratishyaya* and *Kasa* of *Bala Shosha*. GIT infection of PEM although not found in *Bala Shosha* but *Arohak* or loss of appetite is found in both. Principle of *Brimhana*in *Bala Shosha*is same as to proper and energy rich diet of PEM. Basic treatment principle of both the diseases is same that is administration of appetizer and digestive. Extra treatment principle in *Bala Shosha* is *Srotosodhana* to eliminate obstructive *Kapha* in *Rasavaha Srotas*.

CONCLUSION

From the above literary study and discussion of both *Bala Shosha* and PEM, it can be concluded that the present enforcing problem of today's pediatric society protein energy malnutrition can be compared some extent to the disease *Bala Shosha*. It can be treated with many Ayurvedic formulations as given in the *Ayurvedic* text book.

Conflict of Interest

No conflict of interest

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Declaration of competing interest

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