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PARALLEL ANALYSIS OF KIRANTHI WITH BIRTH ASPHYXIA AND NEONATAL HYPOXIC ISCHEMIC ENCEPHALOPATHY - A SIDDHA LITERATURE REVIEW

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ABSTRACT: The traditional Siddha system of medicine has its origin in South India, and it deals with the well being of human race from neonates to Geriatrics. Presently there is an emerging increase in research and publications regarding the evaluation of traditional medicines primarily based on phytochemical, pharmacological, sophisticated instrumental analysis including various in vitro and *in-vivo* studies. Still there exists a gap area in the analysis of ancient literature which is the backbone on which the antique system of medicine such as Siddha exclusively stands. Kiranthi is an ancient Tamil term that is mentioned in the Siddha literature under Karuvil thondrum noigal (Diseases due to intra uterine factors). The prevention and management of Pediatric diseases have been dealt in the Siddha literature. Though these literature were written by ancient sages of South India thousands of years ago, it is quite interesting to know that parallel analysis of these age old poems have revealed its correlation with modern neonatological texts and terminologies. Therefore, this literature analysis was undertaken to compare Kiranthi which is mentioned in Siddha literature with that of the signs and symptoms of Birth asphyxia and Neonatal Hypoxic ischemic encephalopathy (HIE).

INTRODUCTION: The Siddha system lucidly describes the growth and development of children, the probable health issues that a child can encounter at each stage in consonance with different stages (Paruvangal). Paruvangal is the terminology that describes the stages of children from neonates to adolescence and also from early adulthood to later geriatric stages. These are mentioned in linguistic literatures like Meenakshi Pillai Tamil *etc* [1, 2].

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The terminologies of children coined for each stage can be scientifically correlated with the developmental milestones of the growing infants and children. The different stages for male children up to the age of five are Kappu, Senkeerai, Thaalaattu, Sappani, Muththam, Varugai, Ambuli, Sirtril, Siruparai and Siruthaer. For female children, the first seven stages as explained for male children are common and the last three stages are Kalangu, Oonjal and Ammanai.

Kiranthi is described as an Agakaarana Noi that has probable intrauterine cause and refers to the Kaappu paruva Noi which occurs during [1-3] months after birth. Kiranthi is described in literature as two types Sengiranthi and Karungiranthi. While the hallmark in both these conditions represents

asphyxia in infants, Karungiranthi poem symptomatically indicates the severe form of asphyxia. Hence Sengiranthi can be correlated with birth asphyxia and Karungiranthi with that of its severe form which may cause Hypoxic ischemic encephalopathy (HIE).

Birth asphyxia is an important cause of neonatal morbidity and mortality in developing countries. According to a report by WHO, 4 million deaths yearly occurred due to birth asphyxia, which represent 38 % of mortality of children under 5 years of age. In low-income countries 23% of all neonatal deaths occurred due to birth asphyxia [3]. Hypoxic ischemic encephalopathy (HIE) occurs in 1.5 to 2.5 per 1000 live births in developed countries causing serious birth complications affecting full term infants [4]. HIE occurs due to hypoxic-ischemic event of the prenatal, intra partum or postnatal period resulting in brain injury that prevents adequate blood flow to the infant's brain [5]. By the age of 2 years, up to 60% of infants with HIE will die or have severe disabilities including mental retardation, epilepsy, and cerebral palsy (CP) [6].

With the growing worldwide concern to learn and exploit traditional systems, and the need for evidence based medical practice, the evaluation of the rich heritage of ancient literature is vividly necessary. Upon perfect evaluation of these systems it is possible to effectively adopt the therapeutic approaches available in these original texts. Hence this paper involves an integrated review which is an explicit methodology of qualitative research that summarizes the past empirical or theoretical literature to contribute a comprehensive understanding of a meticulous healthcare problem.

Kiranthi in Siddha: Kiranthi is given as "Karuvil Thondrum Noi" which means a disease which begins in utero and follows immediately after birth till 3 months. The stress is given that it occur immediately after birth. In Siddha the cause of the disease is given as imbalance in the three humours Vaatham, Pitham, Kabam which has occurred in utero due to imbalance of maternal diets and habits. Siddha system lays great emphasis on maternal nutrition during pregnancy and also provides herbal interventions that are specified for each month of conception [7].

Senkiranthi:

"Pillai pirantha udan azhuthu
Piragu midaru thanai katti
Mella poonai kural pondru
vidaama neermalam vayiroothi
Thulli kai kaal sivaperi
summa kidaku methannil
Kallamaana sengiranthi
karuthai ithanai kandukolle"

Karungiranthi:

"Muzhanga azhuthu mulai unna
moorchai yaru mudal vethumbum
Kozhungan thirava vai varatchi
kondey atharam karuperum
Azhungi alarum kural kammum
athiga maaga vayiroothum
Puzhungum valikkum karungiranthi
polla thenavum pugandrananarey"

Senkiranthi and Karunkiranthi that are mentioned as Karuvil thondrum noigal can be correlated with that of Birth asphyxia and Hypoxic ischemic encephalopathy respectively. The features of Senkiranthi and Karunkiranthi as described in ancient Siddha texts are quoted below with interpretation.

"Balavagadam" is the text book dealing with child care in Siddha system. It is the branch of medicine dealing with the pediatric diseases that are described symptomatically under common headings like Karuvil thondrum noigal (Diseases in utero), Mantham (Gastro intestinal disorders), Kanam(Respiratory disorders), Karappaan (Skin disorders) and are categorized according to age of the infants. The Siddha literature also deals with the traditional management through Siddha System of Medicine through strong basic principles and cultural background [7].

TABLE 1: INTERPRETATION OF FEATURES OF SENGIRANTHI

S. no.	Lines from Siddha texts	Interpretation
1 and 2	*Pillai pirantha udan azhuthu* *Piragu midaru thanai katti*	Cry of the Neonate followed by apnoeic stage
3	*Mella poonai kural pondru*	Weak cry of newborn comparing to cat's cry

4	*Vidaama neermalam vayiroothi*	Distension of abdomen due to retention of urine and constipation
5	*Thulli*	Exaggerated movement
5	*kai kaal sivaperi*	Pink extremities
6	*summa kedakkume thannil*	Followed by lethargic state
7 and 8	*Kallamaana sengiranthi karuthai thanai kandukolle*	If all these symptoms follow it is very essential to recognise the *Sengiranthi* and take necessary steps to manage it.

TABLE 2: INTERPRETATION OF FEATURES OF KARUNGIRANTHI

S. no.	Lines from Siddha texts	Interpretation
1	*Muzhanga azhuthu mulai unnaa*	Excessive crying followed by refusal to feeding
2	*Moorchai yarum udal vethumbum*	Irritability, jitteriness, fever
3	*Kozhungan thirava vai varatchi*	Inability to open the eyes, and dehydrated lips
4	*Kondey Atharam karuperum*	Bluish discolouration of lips
5	*Azhungi alarum kural kammum*	Vigorous cry followed by inability to cry
6	*Athiga maaga vayiroothum*	Abdominal distension
7	*Puzhungum valikkum karungiranthi*	Severe apnoiec stage with Convulsions
8	*polla thenavum pugandrananarey*	It is a severe form of illness

DISCUSSION:

Scientific analysis of Sengiranthi with Birth Asphyxia: The lines 1 and 2 of Sengiranthi "Pillai pirantha udan azhuthu Piragu midaru thanai katti " which means the cry of the neonate after birth following an apnoeic stage which can be correlated with the onset of apnoea followed by initial cry that favours the diagnosis of Primary apnoea [8]. The second line "Piragu midaru thanai katti" means the sudden cessation of voice or stridor due to closure of glottis [9].

The third line "Mella poonai kural pondru" logically equates the cry of the newborn as "Cat like cry" which is clearly stated in modern Paediatric literature as weak cry or cat like cry of the new born due to esophageal atresia or tracheo esophageal fistula which is said to be one of the causes of birth asphyxia [8]. The fourth line "Vidaama neermalam vayiroothi" clearly states retention of urine and feces which may occur due to renal injury causing reduction in urine output and injury to GIT causing necrotizing enterocolitis causing abdominal distension [9]. The fifth line "Thulli kai kaal sivaperi" describes the exaggerated movement followed by pink extremities. The reason behind this description may be due to the fact that an asphyxiated fetus behaves like a strangulated individual and makes desperate exaggerated fetal movements [8].

This may also denote the vasomotor instability and peripheral circulatory sluggishness can be exposed by deep redness or purple lividity in a crying infant. This discolouration may darken preceding a vigorous cry causing harmless acrocyanosis of hands and feet [10]. Also the Subcutaneous fat necrosis which occurs following perinatal asphyxia causes hardened, erythematous, edematous lesions in arms and thighs sparing chest and abdomen. These lesions slowly soften in 6-8 weeks and completely regress after several months [11, 12]. The line "summa kedakkume thannil" states the lethargic state of infant in a crystal clear colloquial manner that is used in Tamil language.

On comparing these lines with modern literature on birth asphyxia it was found that the exaggerated fetal movements will inturn followed by reduced or absent physical movements terminally [8]. The final lines of Sengiranthi poem cautions the physicians as "Kallamaana sengiranthi karuthai thanai kandukolle" which stresses to suspect sengiranthi in retrospect if followed by all the above symptoms. Specialised neonatal care and follow up is indicated for babies who fail to establish effective breathing at 5 minutes [8].

Scientific Analysis of Karungiranthi with HIE: The first line of Karungiranthi "Muzhanga azhuthu mulai unna" which means strong and vigourous cry followed by refusal to feeding that is described in modern pediatric texts as excessive crying followed by lethargy and no effort in sucking and swallowing with pooling of secretions in oral cavity [8]. The next line "moorchai yaru mudal vethumbum" means irritability, jitteriness, fever that occurs in hypoxic ischemia.

Also it is stated in the text book of neonatal care that high temperatures during usual care following hypoxia-ischemia were associated with increased risk of adverse outcome [13]. The third and fourth lines "Kozhungan thirava vai varatchi Kondey kondey atharam karuperum" denotes inability to open the eyes and dehydrated lips with bluish discolouration. In severe stage of asphyxia changes in pupil of eyes, dysconjugate eye movement, reduced or absent of oculocephalic reflex and Circumoral central cyanosis denoting central cyanosis [8, 14].

The fifth line "Azhungi alarum kural kammum" connote vigorous cry followed by inability to cry which is a salient feature denoting apnoeic attacks of HIE. This symptom is followed by the line "Athiga maaga vayiroothum" that represents the distension of abdomen to a greater extent due to oliguria, necrotizing enterocolitis, paralytic ileus, and stasis that are common gastro intestinal abnormalities which can cause excessive distension of abdomen [8]. The seventh line "Puzhungum valikkum karungiranthi" means severe apnoeic stage with convulsions. It has to be noted here that Seizures can affect 50% of affected infants in HIE mostly within 6-12 hours after birth [8]. The last line, "polla thenavum pugandranananarey" signifies that it is a severe form of asphyxia as the persistence of neurologic abnormalities beyond seven days and usually associated with poor neuromotor outcome [8].

According to modern literature birth asphyxia is caused due to prenatal antecedants like genetic factors, teratogenic agents and adverse early influences. The Siddha literature also lays emphasis on Kiranthi as Karuvil thondrum noigal which means prenatal causes. Birth asphyxia is associated with reduction in oxygen tension and accumulation of carbondioxide and fall in blood pH. This results in acidosis due to anerobic utilization of glucose, production of lactic acid and and accumulation of carbondioxide. These biochemical changes cause increase in pulmonary atrial pressure due to constriction of pulmonary arteriole resulting in reduced left heart and right to left shunt occurs. All of these physiochemical changes perpetuate asphyxia resulting in clinical, pathological, biochemical and metabolic changes that affect many organ and systems like central nervous system, cardiovascular system, pulmonary, renal, adrenal, gastrointestinal tract, skin and haemopoetic systems symptoms resulting in symptoms of asphyxia. Upon analyzing the lines Healthy term infants have an outstanding ability to adapt to sudden episodes of reduced oxygen supply during labour. But situations that exceed fetal capacity sometimes can cause severe hypoxic episodes. The way in which an asphyxiated baby is managed at birth determines the immediate morbidity and quality of life among survivors.

Modern pediatric literature states that about 25% with severe asphyxia are likely to develop Hypoxic ischemic encephalopathy (HIE) which causes cerebral edema leading to cerebral ischemia resulting in multiorgan dysfunction. This may dominate the clinical picture including seizures, hypotonia, poor feeding, and a low level of consciousness that usually lasts from 7 - 14 days with high risk of mortality [8, 15, 16]. Upon analysing the ancient Siddha literature from the Balavagadam text, Senkiranthi refers to resolvable form of birth asphyxia. Moreover it is also said in Siddha literature that apart from few internal medicine kiranthi can be manageable by procedures like Semmulli keerai bath and Mukootu oil bath that can promote head cooling [10]. Several research works have also shown hypothermia to be a promising remedy for the management of hypoxic-ischemia. This age old procedure also lies in parallel with recent experimental modes of decreasing cerebral injury which involves selective head cooling cerebral hypothermia [17 - 19].

Moreover it is explicit that Senkiranthi (Birth asphyxia) is in turn followed by karungiranthi (HIE) which is described in the last line as "pollathu" which denotes the severity of illness. Recent research reveals that HIE followed by perinatal asphyxia may result in long term neurologic sequelae and mortality [20]. Hence from the above **Table 1** and **Table 2** it can be revealed that all the sign and symptoms of Senkiranthi and Karungiranthi that is mentioned in age old Siddha literature of Tamil culture correlates with that of modern pediatric complications of birth asphyxia and Hypoxic ischemic encephalopathy (HIE) respectively.

CONCLUSION: Hence this work on the literature analysis of ancient Siddha text has revealed the

splendid wisdom of Siddhars in the field of medicine. All the signs and symptoms of Kiranthi has been analysed in the light of modern medical terminologies and were found to have appreciable correlation between them. This work can provoke the researchers to explore further on Siddha literature for global acceptance of this antique system of medicine.

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