CASE REPORT

Speech, language and swallowing difficulties in a child with AIDS

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\textbf{ABSTRACT}

AIDS has a great impact on the modern society as a source of illness and discrimination. It can cause a wide spectrum of disorders which can affect the health and life style of individuals. Globally, the number of individuals with AIDS is increasing and the count of such children is also rising drastically. AIDS caused by HIV is known to invade different systems of the body including the central nervous system thus causing neurological abnormalities/complications in children. Children infected with HIV may present with various types of communication disorders. Speech-language pathologists have investigated and reported the assessment and treatment of HIV-infected individuals in the past. However, studies are limited in the line of profiling the nature of communication and swallowing deficits seen in them. The present case study reports a detailed speech, language and swallowing profile of a child infected with HIV. Effective combination of medical and non-medical treatment for the HIV infection witnessed a great deal of improvement in this child. The importance of care and precautions to be considered while treating such children is highlighted.

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\textbf{Introduction}

Globally, there are around 35 million individuals living with HIV infection. Asian and African countries include a majority of HIV-infected population (adult and children) in the world \cite{1}. As per the estimation of Data Hub for Asia-Pacific \cite{2}, there are approximately 200,000 children infected with HIV in Asia and Pacific region. Paediatric population with AIDS have a slightly increasing proportion of the total estimated AIDS-related deaths. India is also facing a major public health crisis due to HIV/AIDS. The prevalence of paediatric HIV is found to be 11.9\% \cite{3} in Eastern parts of India and it is documented that the most common cause of the infection is transmission of the virus from the mother to the child. The prevalence of HIV infection in children aged between 2 and 5 years of age to be 0.58\% in the state of Maharashtra \cite{4}. Also the male to female ratio of children infected with HIV was found to be 1.93:1 and 98.62\% children had vertical transmission of the infection. However, there has been a 33\% decrease in this estimation due to increased awareness and antiretroviral therapy (ART) thus reducing the AIDS-related deaths.

The aetiology and clinical manifestations of HIV/AIDS differ between children and adults. Sexual transmission and blood transfusion are rated to be the dominant cause for HIV/AIDS in adults; however, the mother to child transmission which may take place during gestation, delivery and/or breast feeding is estimated to be the most common cause for paediatric HIV infections \cite{5}. Maternal HIV infection is thought to invade the infants’ central nervous system (CNS) leading to progressive encephalopathy in most of the cases. The primary indicator of CNS abnormality due to HIV is neurodevelopmental difficulties although the course may be variable. The incidence of CNS involvement is found to be greater in HIV-infected children than adults. The Centre for Disease Control (CDC) defines encephalopathy to be characterized by microcephaly, failure to achieve neurodevelopmental milestones and acquired motor deficits.

HIV encephalopathy (HIVE) can be categorized as progressive and static \cite{6}. In the progressive type of HIVE, there is a loss of acquired skills or stagnation in attaining developmental milestones and in the static type; children acquire new skills more slowly than normal. Paediatric HIV-associated neurologic
disorders can be a direct effect of the HIV infection occurring due to immunosuppression or neurotoxic effect of ART [7]. Children infected with HIV are also prone to HAND (HIV-associated neurocognitive disorders) which includes impairments in language, executive functions, behaviour and mental development [8]. Neuropsychiatric issues in children with vertically infected HIV include complex behavioural phenotypes with retained intelligence quotients and progressive decline in the areas of executive functioning [9].

CNS and peripheral nervous system (PNS) abnormalities could be evident consequent to the HIV infection such as HIVE, seizures, strokes, opportunistic infections, CNS neoplasms, HIV myopathy, HIV myelopathy, peripheral neuropathy, and sleep disturbances. Anatomical evidences for these neurological abnormalities have been provided through neuroimaging studies. Cerebral atrophy, basal ganglia calcification, and focal white matter lesions are the most common neuroradiological findings in HIV-infected children [10]. Children with HIV demonstrated ventricular enlargement and/or sulci widening (29%) or white matter lesions (38%) which were associated with developmental delay and language impairments [11].

Different CNS infections may cause varied impairments thus presenting heterogeneous clinical features. However neurological manifestations are not a requisite. There can be HIV-infected children with and without neurological abnormalities [10,12]. Children who do not manifest neurological abnormalities have cognitive development similar to the typically developing peers; however, they might exhibit maladjustment with respect to their emotional and activity spheres. HIV-infected children with neurological abnormalities have delayed cognitive development and impaired social interactions [12]. One of the Indian studies which investigated the neurological disorders in HIV-infected children showed that 7.2% of all the children with HIV, featured neurological complications and a majority had HIVE. They also found the mean age of presentation to be 4.36 years [6].

Otorhinolaryngological manifestations are one of the complications seen in HIV-infected children [13]. A recent study reported 16.8% of otorhinolaryngological manifestation among 137 HIV-infected children from Coastal Karnataka [14]. The common symptom on the first presentation was found to be fever followed by cough and loss of appetite/weight [4]. On examination, a majority had malnutrition as a common sign followed by pallor and respiratory signs. These results supported the findings obtained by Pol et al. [15] in HIV-infected children in the state of Karnataka who reported tuberculosis as the most common opportunistic infection. While, Shahapur and Bairy [16] reported oral candidiasis and recurrent respiratory tract infection as the commonest opportunistic infections in children infected with HIV in Southern India.

A few studies have examined the speech, language, and swallowing impairments in HIV-infected children. The prevalence of speech-language impairments among children infected with HIV is relatively high [11]. Children infected with HIV who demonstrate language impairments would be at risk of poor academic performance [17]. Language impairment is classified as primary and concurrent; former being isolated language impairment without cognitive or hearing impairment and the latter language impairment being associated with cognitive and/or hearing impairment [18]. The risk factors for the language impairments were estimated as greater severity and poor control of the disease [18]. Primary language impairment may be evidenced in the milder stages of the disease. Also a prevalence rate of 40% was reported for language impairment in HIV-infected children [18]. The children with HIV might have deficits in executive functioning and processing speed; however, cognitive delay was not universal [19,20].

The most common speech-language deficits exhibited by children infected with HIV include loss of speech-language milestones, poor language development with the progression of the infection. Children with AIDS may also have phonological disorders, voice deviance, central auditory processing disorders, and learning disorders. About 25% of paediatric HIV cases would be diagnosed as having mental retardation or learning disorders and may require special education services [11].

In children with HIVE, feeding difficulty or poor coordination of swallowing, especially nasopharyngeal incoordination is also reported which might lead to regurgitation, malnutrition, weight loss, aspiration with chronic lung disease [21]. Dysphagia in turn leads to inadequate nutritional support, reduced quality of life, difficulty to taking medications thus increasing mortality in children with AIDS. A study by Nel and Ellis [22] investigated swallowing abnormalities in 25 HIV-infected children using VFSS (Videofluroscopic Swallow Study). They found that 80% had clinical evidence of swallowing abnormalities in which 44% had difficulties in oral phase, 16% in pharyngeal and 25% in both oral and pharyngeal
phases. VFSS showed abnormality in 46% of the children at different phases of swallowing. 83% of the children had swallowing difficulties with recurrent respiratory infections as major presenting symptom. They reported dysphagia as a result of functional disturbances rather than structural or mucosal abnormalities and also highlighted the importance of VFSS in the diagnosis and management of dysphagia in HIV-infected children. Children infected with HIV have a higher rate of oral diseases including soft tissue lesions, salivary gland dysfunction and dental caries on comparison to age-matched typically developing peers [23]. The oral lesions caused by the virus may lead to difficulty in sucking, chewing and/or swallowing [24].

With the initiation of ART, the level of incidence and eventually the mortality due to AIDS has drastically reduced since a decade. Combination of ART includes administration of at least three or more than three drugs systematically to enhance the immunity in the HIV-infected individual and thus reduce the adverse effects caused by HIV infection. The management of paediatric HIV cases includes an interdisciplinary team of professionals.

The speech-language pathologists (SLPs) working in health care setups who would be relatively more exposed to children with transmissible diseases should be aware of the importance of interdisciplinary approach and also the precautionary measures to be taken to avoid the risk of transmission. It is very important for SLPs to protect themselves from spread of the infection. WHO, UNAIDS, UNESCO (1999); Education International, WHO, UNESCO (2001) have recommended few universal standard precautions and essential supplies on hand at all time when working with HIV-infected cases in schools and health care settings. In specific to SLPs dealing with HIV-infected individuals, ASHA (1989, 1999) has put forth certain guidelines and precautionary measures to be adopted which include the following:

i. Ensure to not to get into contact with blood and bodily fluids of the HIV-infected person.

ii. Wear latex gloves when attending to HIV-infected individuals especially rubber gloves if they are bleeding or if the skin is not intact.

iii. Gloves should be disposed appropriately after every use.

iv. Clean the therapy area, toilets and bathrooms with disinfectants after use by HIV-infected individuals.

v. Be aware of hand hygiene program.

vi. Mask or mouthpiece should be used although HIV transmission is negligible through saliva.

ASHA Committee on Quality Assurance has adapted CDC’s Universal Precautions in order to prevent the spread of chronic transmissible diseases, protect SLPs’ health who are dealing with HIV cases and also to ensure the rights to privacy. These policies consider both legal and professional issues for those working in schools, day care centres, institutional environments, health care settings and other setups. The SLPs involved in rehabilitating individuals with HIV should follow the precautionary measures.

Case report

A 4.8-year-old Kannada-speaking male child was brought to the clinic by the caregiver (mother) with the symptoms of regression in speech-language skills, reduced clarity of speech, difficulty in swallowing and weakness in both upper and lower limbs. These symptoms were noticed at the age of 4 years 5 months with no definite known cause and were gradually progressive in nature. Prenatally, the mother had excessive emesis (vomiting) till 8th month of gestation. The child was born through a normal delivery event at full-term weighing 2.8 kilograms at birth. There was no report of any other significant birth history. A postnatal history revealed that the child had episodes of breath holding on crying followed by falling unconscious at 4 months of age which subsided gradually. He also had frequent ear infections with regular discharge and he was prone to upper respiratory tract infections. Developmental milestones including speech-language and motor milestones were reported to be normal until the initiation of the reported symptoms. The child is from an upper-class nuclear family with no significant family history of communication disorders. The educational background of the family revealed that his parents were graduates; father runs his private business and mother works for central postal department. His elder brother aged 12 years has developed through a normal course of speech, language and motor milestones. The communication model and interactions in the family was mainly through speech and the child is exposed to Kannada and English languages. Kannada language, being the mother tongue was used majority of the time. The child was exposed to English language in a pre-school setup. All the medical investigations including biochemistry (except for ammonia levels being lower than normal range), EEG, and MRI done at the age of
4.9 years revealed normal study. The child had undergone a course of Ayurveda treatment which included intake of herbal capsules and herbal oil massage. However, no improvement was noticed as per parents’ report. At the time of reporting to the clinic, he was not under any medication.

A detailed speech, language, hearing, psychological and motor assessments were done during the child’s first visit at the age of 4 years 9 months. An oral mechanism examination was conducted which revealed certain findings which has been depicted in Table 1. He had mild-moderate drooling due to poor lip seal. Other vegetative functions such as blowing and sucking through a straw were also severely affected. Oral sensory abilities were observed to be adequate. An informal evaluation of different subsystems involved in speech production was also carried out done SLP revealed the following which has been depicted in Table 2.

An informal assessment of swallowing abilities was carried out which was primarily based on parental reports and a meal session. As reported by the parents, the child had difficulty in the intake of solid food items which was evidenced by intermittent choking sequences. Consistent choking episodes on drinking water were observed. He had difficulty in chewing and swallowing the food. He had episodes of nasal and oral regurgitations during the intake of the same. He had completely stopped having spicy food. He preferred bland mashed diet and took longer time to finish his meals. He had prolonged meal time duration (around 20 min with breaks in between). These observations were indicative of oro-pharyngeal dysphagia.

He preferred to use his left hand compared to his right hand for all the activities of daily living. He preferred to eat using a spoon. Cough on demand was observed to be weak and effortful.

The various components of language were also evaluated. As per the speech-language assessment checklist [25], his receptive age was found to be 28–30 months and expressive age was found to be 22–24 months. He had poor semantic word knowledge with restricted usage of varied vocabulary. Syntactic structure was limited in terms of mean length of utterance. He expressed his needs predominantly through pointing and occasionally through the use of bisyllabic words. A description of his language skills has been depicted in Table 3.

The audiological evaluation revealed hearing sensitivity within normal limits as per pure tone audiometry. The clinical psychologist opined that he was a child with average intelligence as per Developmental Screening Test [26]. An informal evaluation revealed a mild difficulty with orientation to space, sustained attention, and working memory. The evaluation by a physiotherapist and an occupational therapist revealed that he had weakness in right upper and left lower limb. Although he could walk independently, he required maximum support to climb the staircase and was unable to run and jump on his own. He demonstrated wide-based gait with dragging of left foot. His dynamic balance was affected associated with frequent falls. Hand functions were reduced in right hand but he was able to grossly coordinate activities using his left hand. He had achieved tripod grasp with reduced stability. He was dependent for all his activities of

| Table 1. Findings of oral mechanism examination. |
|-----------------------------------------------|
| **Oral structure** | **Structure** | **Function** |
| Lips | Normal symmetry | Restricted lip movements during puckering and retraction; reduced range and speed of movement; seal was affected |
| Tongue | Normal | Restricted protrusion, elevation and lateral movements; reduced range and speed of movement |
| Teeth | Most of the teeth were decayed except for one canine tooth on the upper jaw (right side) | Inadequate biting and chewing abilities; attempts to use intact canine tooth for biting |
| Velum | Normal | Reduced movement (on phonation) |
| Hard palate | Normal | |
| Jaw | Normal symmetry | Reduced strength, range and speed of movement |

| Table 2. Assessment of different subsystems involved in speech production. |
|---------------------------------------------------------------|
| **Sub-systems** | **Findings** |
| Respiratory system | The child exhibited shallow breathing pattern with poor respiratory control for speech production. Mouth breathing was observed at times |
| Phonatory system | Perceptually the child had deviant habitual pitch; he could sustain phonation to a maximum of 1–2 s |
| Resonatory system | The child had severe hypernasality as perceived |
| Articulatory system | The child could attempt near accurate place of articulation, but manner of articulation was severely affected; speech intelligibility and acceptability were observed to be poor |
| Prosody | The child’s prosody was found to be disrupted due to monotony with restricted pitch and loudness variations; restricted stress and intonation patterns in his expressive speech was noted |
daily living. His sensory abilities were observed to be normal.

Based on the above evaluations, the child was diagnosed as having developmental dysarthria. He was recommended to attend speech-language therapy and physiotherapy for the same. However, the parents did not engage in therapy due to personal issues.

At the age of 5.1 years, the child was detected to have HIV infection for which ART was initiated. The mode of infection was found to be vertical transmission wherein both the parents were infected with HIV. The child underwent combination ART which included antivirals such as Lamivudine (30 mg), Nevirapine (50 mg), and Zidovudine (60 mg) which was issued by National AIDS Control Programme, India. As per his body weight, this drug combination was prescribed twice daily and had to be consumed orally. These tablets were intended to reduce the HIV amount, increase the CD4 cell count and thus improve the immune system.

The parents brought the child back to the clinic at the age of 5.1 years for speech-language therapy and physiotherapy after 5 months of the first visit. The symptoms had slightly worsened at the time of therapy initiation compared to the first visit. Based on the baseline skills of the child, therapeutic interventions were initiated by a student pursuing postgraduation programme in Speech-Language Pathology (who shall be quoted as speech-language therapist hereafter). During speech-language therapy, the following regressed skills were tapped on with specific goals as mentioned.

i. To improve respiratory support for speech and non-speech activities
ii. To improve oral resonance
iii. To increase the strength, range and speed of movements of the oral musculature thereby improving the rate and precision of articulation
iv. To improve verbal communication skills (mean length of utterance, initiation and maintenance of conversation)
v. To improve intelligibility and acceptability
vi. To improve cognitive-linguistic abilities
vii. To improve bulbar functions and
viii. To improve overall quality of life.

The child began to attend speech-language therapy at the age of 5.1 years soon after he initiated ART and attended around 70 sessions of individual speech therapy (each session of 45-min duration) regularly in a span of 4 months until he turned 5.4 years. The above-mentioned goals were worked upon through a varied set of activities. A proper breathing pattern was introduced through demonstrations using tactile and visual feedback. Phonation of vowels /a/,/i/ and voiceless fricative /s/ and blowing into water in a glass through a straw and sustaining for a span of 5 s was carried out. To improve oral resonance, visual feedback using mirror and air paddle An air paddle can be cut from a piece of paper and placed underneath the nares during speech. If the paddle moves during the production of pressure-sensitive sounds, this indicates that there is nasal air emission [27]; and tactile (fingers under his nostril) feedback was provided to make him aware of nasal air emission. Later, production of sounds in isolation, words and phrases with nasal and oral sounds was worked upon. Pressing the tongue blade downwards was done so as to increase the velar involvement and improve the awareness of the structure. Isotonic and isometric exercises for the oral musculature such as lips, jaw and tongue was carried out. These were primarily done using speech-based activities. Phonetic placement technique was incorporated to improve the articulatory precision in isolation, at word, phrase and sentence level. Chewing was worked upon. He would be asked to chew solid food items with the help of residual dental structures; certain number of times (approx. 10) and then swallow. To improve swallowing chin tuck strategy was practiced especially during the intake of liquids. The practice of chin tuck strategy (placing the chin towards the chest) has been proved to be efficient in passing the food way from the airway [28,29].
This strategy prevented the premature spillage of food, giving more time for the vocal folds to close. Spicy and solid food items were introduced. Thermocol balls, paper pieces, see-scape device, candle and bubbles were used for improving blowing with goals of increasing distance and duration of sustenance. Straw sucking was practiced with chin tuck position.

At the time of discharge from speech-language therapy, there was a notable improvement in the child’s quality of communication and life. The observed progress in the child is briefly summarized below which was documented by the speech-language therapist who was involved in the assessment procedure.

1. Speech sub-systems: The child developed appropriate breathing pattern with relatively good control over his respiration during speech. The severity of perceived hypernasality reduced from very severe to mild-moderate degree. He could sustain phonation for a span of around 5 s with comparatively good oral resonance. The production of oral sounds in terms of quality and duration of sustenance also improved. There was a significant improvement in the range and speed of movements of articulators such as lips, tongue and jaws. He could maintain lip seal on demand up to a maximum of 30 counts. Drooling had relatively reduced to a mild degree. He could swallow the saliva on demand 100% of the time and swallow spontaneously at times. He only required verbal reminders to swallow the saliva when he indulged in any activity of interest to him. He could produce bilabial, labiodental, alveolar and velar sounds in isolation with good intelligibility. Connected speech was fairly intelligible (to strangers) as observed. He spoke with exaggerated articulatory movements, open mouth and increased loudness in an effort to convey his needs, ideas and thoughts with clarity.

2. Language: The child used speech as his primary mode of communication. He could use 3–5 word utterances in his spontaneous speech (rarely associated with gestures). He was able to carry out conversation with peers of his age group, elderly people without any prompts. His intent to initiate the conversation (through greeting and asking for his desired objects) with individuals known to him had improved. He was able to maintain the conversation with prompts provided by communication partners.

3. Cognition: There was an improvement observed in terms of the child’s orientation to space, working memory, judgement and reasoning abilities (based on informal evaluation by the SLPs).

4. Bulbar functions: The extent of regurgitation and choking on drinking liquids significantly reduced with chin tuck position. He could chew the food and prepare bolus with the help of residual dental structures and needed monitoring and reminders to properly chew the food. He preferred solid food items and was motivated to eat food items with a slight spicy taste towards the end of therapy. Time taken to finish his meals was relatively reduced and the quantity of food intake had also increased. However, occasional spillage of liquids from mouth was observed. He could sustain blowing for 3–4 s and could suck small sips of liquids through straw.

5. Sensory-motor abilities: The child showed a gradual and remarkable improvement in his sensory-motor skills. He could walk, climb stairs, run and jump independently with relatively adequate dynamic balance. Usage of right hand for daily activities such as eating, holding things, throwing, and writing was noticed. He was comparatively independent and required minimal assistance in performing the activities of daily living such as eating, grooming, and toileting.

During the management of the case discussed, necessary precautions were followed. Mask, disposable gloves and spectacles were used during therapy sessions. Contact with the child was avoided when he had open wounds without affecting the therapeutic intervention. Use of hand sanitizers and disposal of used teaching aids was done regularly after each session. The child was discharged from therapy and was advised an intensive home training program. Regular follow-up assessments were recommended to track the progress of the child. An MRI was again done after the child was discharged from therapy which revealed normal study.

Discussion

The case report presented here summarizes the speech-, language- and swallowing-related deficits in a child infected with HIV. Although the child was born to infected parents, he had normal course of speech, language, cognitive, social and emotional development. However, few deviances were manifested and noticed after 4 years of age. A gradual deterioration in speech clarity, weakness in both upper and lower limbs was observed. Similar findings have been
reported by Gupta et al. [6] in which they reported that the mean age of presentation of the symptoms was 4.36 years. However, causative factor for the child’s condition was not known. A detailed assessment of speech-language skills was carried out by a SLP and management was planned based on the assessment profile.

AIDS is a spectrum of conditions caused by the infection of HIV. Most commonly, the symptoms manifest as systemic illness once the immune system is majorly affected. Although the primary infection is to the immune system, it may also affect the nervous system causing neurological disorders [6,8,10,14,30]. The child exhibited regression and slurring of speech along with restricted mobility and strength of articulators which support the presence of damage in the brain. However MRI in the present case revealed a normal study. Though the child had a normal MRI study, it is presumed that there could have been some hidden damages in the brain areas which were not evident through the MRI study.

Paediatric HIV patients might present neurodevelopmental delay and/or progressive motor dysfunction which were also seen in the case discussed earlier. The child had gradual regression of speech-language skills and motor abilities. This child also had expressive language deficits with respect to phonology, syntax and semantics. Syntactic structure was limited in terms of mean length of utterance. He used limited verbal utterances accompanied with pointing and simple gestures to express his needs. He had poor semantic word knowledge with restricted usage of varied vocabulary. Speech turned unclear and hypernasal indicating deficits in articulatory and resonatory systems, respectively. The functioning of oral structures such as lips, tongue and velum deteriorated gradually. Later, he also manifested difficulties in bulbar functions including chewing, blowing, straw sucking and swallowing. He developed motor dysfunction in left lower limb and right upper limb affecting his gait and writing abilities, respectively. The case discussed here had speech-language and swallowing impairment with mild cognitive deficits. These signs point out to the fact that the nervous system of the child was affected.

The findings obtained after the detailed assessment of the child are in line with the studies reported in the literature. Children with HIV tend to have frequent ear infections [14] which were evidenced in the present child. The language deficits in these children are reported to be sometimes associated with cognitive deficits, and sometimes seen in the absence of cognitive deficits [18]. Children infected with HIV exhibit loss of speech-language milestones, poor language development with the progression of the infection [24]. The communication disorders seen in children infected with HIV were reviewed and delayed language development was reported to be more common followed by dysarthria accounting for 20% of the children. The child in this study was also diagnosed to have dysarthria. Children with AIDS may also have phonological disorders and voice deviances such as hoarseness which was also evidenced in this child along with hypernasality. The children with HIV had deficits in executive functioning and processing speed; however, cognitive delay was not universal [30]. This child reported here did have mild cognitive deficits such as poor judgement skills and altered spatial orientation.

Feeding difficulty or poor coordination of swallowing, especially nasopharyngeal incoordination which might lead to regurgitation, malnutrition, weight loss, aspiration with chronic lung disease is seen in children with HIV [21,22]. This child also had difficulty in oral and pharyngeal phases of swallowing. He had difficulty in chewing due to decayed and missing teeth. He experienced choking episodes on intake of liquids. He was fed only semi-solid food items; however, the quantity of food intake was less and meal time was prolonged.

Literature has suggested a multidisciplinary approach including medical, physical, occupational, behavioural and speech therapy in the treatment of neurodevelopmental disorders in children infected with HIV. The presented case did undergo a multidisciplinary treatment approach which included medical, occupational and speech-language therapy since the infection was noticed. Significant improvement was found in terms of the child’s speech-language-, cognitive-, behavioural-, swallowing-, and motor-related skills. High education of the parent and efficient home training contributed to the child’s improvement. Society should acknowledge the needs of such children and support their integration.

Conclusions
The above paediatric HIV case report highlights the assessment and management of speech, language, swallowing and motor deficits. The child underwent speech-language therapy, physiotherapy and medical treatment during the course of observation. With the combined effect of non-medical and medical treatment, the child showed significant improvement in his deficit areas.
With an increasing awareness of communication- and swallowing-related deficits which might persist in children infected with HIV, the role of SLPs in the assessment and management of paediatric HIV cases is also increasing. The rehabilitation provided by SLPs mainly aims at improvising the quality of life in a non-medical aspect. The course of rehabilitation and the adjoining risks associated during the same would be of major concern to be considered when working with paediatric HIV cases. The prognosis would be dependent on the stage of infection, severity of the disease, initiation of ART, response of the immune system to the treatment, family support, and other associated conditions.

**Disclosure statement**

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

**References**

[1] UNAIDS H: AIDS estimates, 2013.

[2] Data Hub for Asia-Pacific: AIDS Estimates, 2013.

[3] Guha P, Sardar P. Prevalence of paediatric HIV infection in Eastern India – first report. J AIDS Clinic Res. 2011;2:127.

[4] Solunke VN, Kamble MB, Suryawanshi AR, et al. A study of prevalence of HIV infection in children attending paediatric department. IJRTSAT. 2014;11:58–62.

[5] Doare KL, Bland R, Newell ML. Neurodevelopment in children born to HIV-infected mothers by infection and treatment status. Pediatrics. 2012;130:e1326–e1344.

[6] Gupta S, Shah DM, Shah I. Neurological disorders in HIV-infected children in India. Ann Trop Paediatr. 2009;29:177–181.

[7] Thomaidis L, Bertou G, Critselis E, et al. Cognitive and psychosocial development of HIV pediatric patients receiving highly active anti-retroviral therapy: a case control study. BMC Pediatr. 2010;10:99.

[8] Nassen R, Donald K, Walker K, et al. Management of mental health disorders and central nervous system sequelae in HIV-positive children by adolescents. South Afr J HIV Med. 2014;15:81–96.

[9] Donald KAM, Walker K, Riordan G, et al. Neurological complications of HIV/AIDS in childhood. CME. 2011;29:156.

[10] Kauffman WM, Sivit CJ, Fitz CR, et al. CT and MR evaluation of intracranial involvement in pediatric HIV infection: a clinical-imaging correlation. AJNR. 1992;13:949–957.

[11] Mashburn AJ, Myers SS. Advancing research on children with speech-language impairment: an introduction to the early childhood longitudinal study—kindergarten cohort. Lang Speech Hear Serv Sch. 2010;41:61–69.

[12] Lindsey JC, Malee KM, Brouwers P, et al. Neurodevelopmental functioning in HIV-infected infants and young children before and after the introduction of protease inhibitor-based highly active antiretroviral therapy. Pediatrics. 2007;119:e681–e693.

[13] Hoare S. HIV infection in children – impact upon ENT doctors. Int J Pediatr Otorhinolaryngol. 2003;67:85–90.

[14] Yamini MC, Sreedharan S. Otorhinolaryngological manifestations among HIV positive children in coastal Karnataka. J Clin Diagn Res. 2015;9. doi:10.7860/JCDR/2015/9630.5702

[15] Pol RR, Shepur TA, Ratageri VH. Clinico-Laboratory profile of pediatric HIV in Karnataka. Indian J Pediatr. 2007;74:1071–1076.

[16] Shahapur PR, Bairiy I. Clinico-Immunological profile of children infected with HIV through vertical transmission, in Southern India. J Clin Diagn Res. 2014;8:DC09–DC11.

[17] Brackis-Cott E, Kang E, Dolezal C, et al. The impact of perinatal HIV infection on older school-aged children’s and adolescents’ receptive language and word recognition skills. AIDS Patient Care STDs. 2009;23:415–421.

[18] Rice ML, Buchanan AL, Siberry GK, et al. Language impairment in children perinatally infected with HIV compared to children who were HIV-exposed and uninfected. J Dev Behav Pediatr. 2012;33:122–123.

[19] Baillieu N, Potterton J. The extent of delay of language, motor, and cognitive development in HIV-positive infants. J Neurol Phys Ther. 2008;32:118–121.

[20] Baker SE, Niec LN, Meade J. A comparison of friendship quality and social functioning among children with perinatally acquired HIV, children with persistent asthma, and healthy children of HIV-positive mothers. J Pediatr Psychol. 2012;37:580–590.

[21] Rabie H, Marais BJ, van Toorn R, et al. Important HIV-associated conditions in HIV-infected infants and children. S Afr Fam Pract. 2007;49:12–23.

[22] Nel ED, Ellis A. Swallowing abnormalities in HIV infected children: an important cause of morbidity. BMC Pediatr. 2012;12:68.

[23] Flaitz CM, Hicks MJ. Oral manifestations in paediatric HIV infection. In: Shearer WT, Hanso IC, editors. Medical management of AIDS in children. Philadelphia (PA): WB Saunders Co; 2003:249–269.

[24] Davis-McFarland E. Pediatric HIV/AIDS: issues and strategies for intervention. ASHA Lead. 2002;7:10–21.

[25] Swapan N, Jayaram Prema KS, et al. Assessment checklist for speech-language and cognitive domain in preschoolers. AIISH Research Funded project. 2010.

[26] Frankenberry WK, Dobbs JB. The Denver developmental screening test. J Pediatr. 2007;71:181–191.

[27] Kummer AW, Lee L. Evaluation and treatment of resonance disorders. Lang Speech Hear Serv Sch. 1997;27:271–281.
[28] Redstone F, West JF. The importance of postural control for feeding. Pediatr Nurs. 2004;30:97–100.

[29] Serlin M. Language and swallowing intervention in children with cerebral palsy. A research paper submitted in Partial Fulfillment of Requirements for the Master of Science degree to Northern Illinois University; 2012.

[30] Koekkoek S, De Sonneville LM, Wolfs TF, et al. Neurocognitive function profile in HIV-infected school age children. Eur J Paediatr Neurol. 2008;12:290–297.