

ORIGINAL ARTICLE

HEALTH CONDITIONS SCREENED BY THE 4D`S APPROACH IN A DISTRICT EARLY INTERVENTION CENTRE (DEIC) UNDER RASHTRIYA BAL SWASTHYA KARYAKRAM (RBSK) PROGRAM

B Rameshbabu¹, KS Kumaravel¹, J Balaji¹, P Sathya², N Shobia¹.

¹Department of Pediatrics, Government Dharmapuri Medical College, Dharmapuri, India, ²District Early Intervention Centre, Government Dharmapuri Medical College, Dharmapuri, India.

ABSTRACT

Aim: Rashtriya Bal Swasthya Karyakram (RBSK) is aimed at screening children for 4 Ds - Defects at birth, Diseases of childhood, Deficiencies and Development Delays including Disabilities and early intervention of these conditions. This study is aimed at finding the pattern of various health conditions screened under the 4D's approach.

Methods and Materials: This is a one year observational study done in District Early Intervention Centre (DEIC), Dharmapuri, Tamilnadu. Children referred to DEIC were screened by the pediatrician as per Rashtriya Bal Swasthya Karyakram (RBSK). The profile of the children who attended the DEIC like age, sex, place of referral, diagnosis, treatment given and outcome were tabulated and analyzed. An analysis of the manpower available during the study period was also done.

Results: During the study period, 7416 children were found to have one of the listed 30 conditions under 4D's approach of screening. Childhood diseases were seen in 3060 (41.3%) children followed by developmental delay in 1432 (19.3%) children, deficiencies in 1087 (14.6%) children and defects at birth in 804 (10.8%) children. Among the defects at birth, congenital heart diseases were the commonest screened condition found in 437 (5.9%) children. About 192 (2.6%) neonates were found to have Retinopathy of Prematurity of varying grades. On analysis of deficiencies, severe anemia was observed commonly in 628 (8.5%) children. There were 250 (3.4%) children with severe acute malnutrition. On analysis of childhood diseases, dental caries were seen in 1719 (23.2%) children and skin conditions in 553 (7.5%) children. About 44 (0.6%) children were found to have rheumatic heart disease. On analysis of delays and disabilities, vision impairment like squint and refractory errors were the commonest screened condition seen in 1080 (14.6%) children. Neuro-motor impairment were seen in 78 (1%) children, language delay in 99 (1.3%) children and learning disorders in 88 (1.2%) children were the less frequently observed disabilities. There were 9 (0.1%) cases of behavioral disorders including autism and were treated with multi modal therapy including sensory integration. All the posts except early interventionist/special educator and dental hygienist were occupied throughout the study period.

Conclusion: Through RBSK India has taken giant step for screening and early intervention for defects at birth, childhood diseases, deficiencies and disabilities. The shortage of specialist manpower like special educator is of major concern and youngsters should be motivated to take up rehabilitation sciences as a career option.

Introduction

Out of every 100 babies born in our country every year, 6 to 7 babies have a birth defect.¹ This will mean 1.7 million birth defects occur annually and will also account for 9.6% of all neonatal deaths.¹ Under nutrition or nutritional deficiencies affecting the preschool children ranges from 4 to 70% in our country.² Developmental delays are also common in early childhood affecting at least 10% of our children. Special Newborn Care

Units (SNCU) Technical Reports have estimated that approximately 20% of babies discharged from SNCU are found to suffer from developmental delays and/or disabilities at a later life.³ These delays, if not intervened early, may lead to permanent disabilities in cognition, hearing and vision. There are also many diseases which are very common in children e.g., dental caries, otitis media, rheumatic heart disease and reactive airway diseases which should be treated early. Early intervention and management can prevent these conditions from progressing into severe forms and reducing hospitalization.¹

Rashtriya Bal Swasthya Karyakram (RBSK) or Child Health Screening and Early Intervention Services is a new initiative by the Government of India launched in February 2013 which is aimed at screening children

CONTACT KS Kumaravel

Email: kumaravelks@rediffmail.com

Address for Correspondence: Dr. K S Kumaravel, 191A, Shankar Nagar, Salem 636007, Tamil Nadu, India.

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for 4 Ds - Defects at birth, Diseases, Deficiencies and Development Delays including Disabilities.⁴ The target group under RBSK program is estimated to be 27 crore children under the age of 18 years and is divided into three age groups – 0 to 6 weeks, 6 weeks to 6 years and 6 years to 18 years.⁵ Under its organizational structure, Accredited Social Health Activists (ASHA's) and Mobile Health Teams (MHT) will do the community screening, while the District Early Intervention Centers (DEIC) located in the District headquarters will screen, diagnose and treat children referred from the community. Further all neonates delivered in institutions will be screened by a pediatrician in Delivery Point Screening. DEICs are well equipped to attend to the children referred from the community and have the following specialists – Pediatrician, Medical Officer, Early Interventionist, Speech therapist, Audiologist, Optometrist, Lab technician, Dentist and a Dental Hygienist apart from the clerical staff. Children diagnosed with any of the 30 listed health conditions shall receive follow up treatment including surgeries at tertiary level, free of cost. The services provided by DEIC include occupational and physical, psychological, cognitive, audiological, language, vision, speech, and nutritional therapies apart from laboratory services. DEICs also provide other ancillary services like assistance in getting disability certificates.

Significant progress has been made in reducing mortality in children in the past decade. Further reduction in mortality is possible by early detection and management of health conditions in children. With improvements in health care facilities, the incidence of survival of infants with birth defects is increasing.⁶ Also, the burden due to non-communicable diseases will greatly increase in India unless early and appropriate interventions are made.⁶

This study is aimed at finding out the pattern of various health conditions screened under the 4D's approach in children attending the DEIC in our hospital. An analysis of the specialist manpower available during the study period was also done.

Methods & Materials

This was a one year observational study done from Jan 2018 to Dec 2018 in DEIC, Govt. Dharmapuri Medical College Hospital, Dharmapuri, Tamilnadu. Dharmapuri is one of the backward districts situated in northern Tamilnadu and has 8 blocks. Each block has one male and one female doctor heading a MHT. These MHTs carry out the screening of children in their block and refer children suspected or identified with any of the 30 conditions to the DEIC. The study population was formed by the children with any one of the 30 conditions referred to DEIC from the peripheral RBSK units, neonates screened at Delivery Point Screening in the hospital, children referred from the pediatric out-patient clinic and also children who come on their own. On arrival at DEIC, children were screened by the pediatrician as per RBSK operational guidelines and appropriate treatment was given.⁷ Elaborate guidelines for setting up and functioning of a DEIC are clearly given by RBSK.⁷ The profile of the children who attended the DEIC like age, sex, place of referral, diagnosis, treatment given and outcome were tabulated and analyzed. An analysis of the manpower available

during the study period was also done.

Results

The results are tabulated in Tables 1 & 2. During the study period, 7416 children who attended the DEIC were found to have one of the 30 conditions under 4D's approach of screening. There was no referral from ASHA's during the study period, as all the MHTs in the district were manned by medical graduates.

On analysis of the 30 conditions screened under 4D's approach, childhood diseases were seen in 3060 (41.3%) children followed by developmental delay in 1432 (19.3%) children, deficiencies in 1087 (14.6%) children and defects at birth in 804 (10.8%) children. There were 523 neonates screened for Retinopathy of Prematurity (ROP) during the study period and 192 (2.6%) neonates were found to have ROP of varying grades. Three neonates were treated with laser photo-coagulation therapy and 6 neonates were treated with injections of bevacizumab. Rest of the cases with ROP resolved spontaneously. There were 250 (3.4%) children with severe acute malnutrition and they were treated in the Nutritional Rehabilitation Centre attached to the hospital. There were 44 (0.6%) children with rheumatic heart disease and they were registered for penicillin prophylaxis. There were 9 (0.1%) cases of behavioral disorders including autism screened during the study period and were treated with multi modal therapy including sensory integration and occupational therapy. RBSK has given a great impetus to the treatment of children with disabilities like autism. Elaborate guidelines were given for establishment of specialized therapies like sensory integration therapy.⁷ All the other developmental delays like cognitive delays, language delays, behavioral disorders and learning disorders were diagnosed and treated with the help of Psychiatry department in the hospital and the psychologist attached to the DEIC.

There were 1033 (13.9%) children screened with other conditions like tongue tie, polydactyly, beta-thalassemia, congenital hypothyroidism, sickle cell anemia, obesity, phimosis, dermoids, hydronephrosis, microcephaly, dwarfism, hypospadias, undescended testis, osteogenesis imperfecta and bed wetting. These children were also enrolled and treated in DEIC.

On analysis of the human resources available in the DEIC, the posts of Pediatrician, medical officer, dentist, physiotherapist, optometrist and lab technician were occupied throughout the study period. The post of early interventionist and dental hygienist were vacant throughout the study period. The services of audiologist/speech therapist and psychologist were frequently not available during the study period and frequent resignations and new appointments were noted in these posts in the past also.

Discussion

In the world, 64.3 children per thousand live births are born with birth defects every year.¹ India with about 26 million births per year will have the largest share of birth defects in the world. RBSK program has undertaken the early identification and treating these defects at birth, which will yield rich dividends in nurturing the health of our children. In our study of screening of children under 4D's approach, about

Table 1. Profile of children attending DEIC, pattern of referral, human resources availability and surgically treated conditions

Age and sex distribution of study group	
Age group	Total (%)
0 – 6 weeks	1033 (13.9%)
6 weeks – 6 years	2586 (34.9%)
6 – 18 years	3797 (51.2%)
Total	7416

Pattern of referral to DEIC	
Place of referral	No (%)
Mobile health teams	4740 (63.9%)
Health facility/Delivery point	275 (3.7%)
Self-referral to DEIC	2401 (32.47%)
Total	7416

Human Resources available in DEIC	
Specialist	Availability
Pediatrician	Available
Medical Officer	Available
Dentist	Available
Dental hygienist	Not available
Optometrist	Available
Physiotherapist	Available
Lab technician	Available
Early interventionist	Not available
Psychologist	Frequently not available
Audiologist & Speech therapist	Frequently not available

4D's Conditions screened	
Defects at birth	804 (10.8%)
Deficiencies	1087 (14.6%)
Childhood diseases	3060 (41.3%)
Developmental delays and disabilities	1432 (19.3%)
Others	1033 (13.9%)
Total	7416

Conditions treated surgically	
Condition	Surgery done (No)
Neural Tube Defect	2
Club foot	28
Cleft palate & lip	18
Congenital Cataract	2
Congenital Heart Diseases	50

Table 2. Health Conditions screened by 4D's approach

Sl. No	Condition	No (%)
Defects at birth		
1	Neural Tube Defect	24 (0.3%)
2	Down's Syndrome	29 (0.4%)
3	Cleft Lip & Palate	32 (0.4%)
4	Club Foot	72 (1%)
5	Developmental Dysplasia of the hip	5 (0.1%)
6	Congenital Cataract	5 (0.1%)
7	Congenital Deafness	8 (0.1%)
8	Congenital Heart Diseases	437 (5.9%)
9	Retinopathy of Prematurity	192 (2.6%)
	Total	804 (10.8%)
Deficiencies		
10	Severe Anemia	628 (8.5%)
11	Vitamin A Deficiency (Bitot's Spot)	9 (0.1%)
12	Vitamin-D Deficiency	18 (0.2%)
13	Severe acute malnutrition	250 (3.4%)
14	Goiter	182 (2.4%)
	Total	1087 (14.6%)
Childhood diseases		
15	Skin Conditions	553 (7.5%)
16	Otitis Media	185 (2.5%)
17	Rheumatic Heart Disease	44 (0.6%)
18	Reactive Airway Disease	401 (5.4%)
19	Dental Caries	1719 (23.2%)
20	Convulsive Disorders	158 (2.1%)
	Total	3060 (41.3%)
Developmental delays and disabilities		
21	Vision impairment	1080 (14.6%)
22	Hearing impairment	49 (0.6%)
23	Neuro Motor impairment	78 (1.0%)
24	Motor Delay	12 (0.2%)
25	Cognitive Delay	9 (0.1%)
26	Language Delay	99 (1.3%)
27	Behavior Disorder (Autism)	9 (0.1%)
28	Learning Disorder	88 (1.2%)
29	Attention Deficit Hyperactivity Disorder	8 (0.1%)
	Total	1432 (19.3%)
30	Others	1033 (13.9%)

41.3% children had childhood diseases followed by developmental delays and disabilities (19.3%). In the childhood diseases we observed dental caries (23.2%) as the commonest condition followed by skin conditions (7.5%). In a community study by Tiwari in Madhya Pradesh, skin diseases (64%) were more prevalent than dental caries (6.8%).⁸ In another study by Sambo et al, skin conditions had a prevalence of 21%.⁹ On analysis of deficiencies, severe anemia (8.5%)

was observed commonly followed by severe acute malnutrition (3.4%). In a study from the Nutritional rehabilitation Centre attached to this institute in the year 2014, an incidence of 5.1% was noted for SAM.¹⁰ On analysis of defects at birth, congenital heart diseases had a prevalence of 5.9%. The prevalence varied from study to study depending on the study population. In a hospital based study the incidence reported was 3.9/1000 live births.¹¹ In a community

based studies, the prevalence ranged from 0.8 to 5.2 per 1000 population.^{12,13}

On analysis of developmental delays and disabilities, visual impairment conditions like squint and refractory errors (14.6%) were commonly observed. About 6.2% of children were found to have language delay in a study by Sidhu M.¹⁴ In our study we have reported an incidence of 1.2% for learning disorders. Learning disorder is a neurological disorder that affects the brain's ability to receive, process, store and respond to information. Various other studies done by Mogasale, Choudhary, Roongpraiwan, Shayawitz and Berger have reported a prevalence of 11.2%, 7.47%, from 6.9% to 9.0%, 6.3%, around 7% and 9.9% respectively^{15,16,17,18,19} for learning disorders. The large degree of variations in the prevalence depends on the study population and the awareness among the school teachers and parents about learning disorder. The behavioral disorders like autism were found to have 0.1% prevalence in this study. A study by Poovathinal reported 0.23% prevalence in semi-urban India.²⁰ The disabilities found in this study may represent only the tip of the iceberg. More intensive screening and sensitization of teachers and parents will help in identification of more children with these problems.

The manpower analysis during the study period found that the post of early interventionist/special educator was vacant throughout the study period. The other posts of speech therapist/audiologist and psychologist were frequently vacant during the study period. Studies by Parmar and Bijaya Kumar Panigrahy also reported manpower deficiencies in DEIC.^{21,22} The shortage of specialist manpower especially in semi-urban and rural locations is a serious handicap to the treatment of children with disabilities. With the implementation of DEIC, the needs for these specialist manpower has increased tremendously across the country.

The major achievements of this DEIC were the surgeries done for congenital heart diseases, congenital cataract, club foot, cleft palate/lip and neural tube defects. Other treatments in the DEIC include distribution of hearing aids and spectacles, growth hormone replacement therapy and transfusion and iron chelation for thalassemia.

Conclusion

Under 4D's approach of screening childhood diseases were the commonest condition screened. The idea of early intervention is to intervene early and minimize disabilities. Once the disability has already been established then the intervention will include enhancement of child development to reach the highest potential and prevent progression to handicap. Through RBSK India has taken giant step for screening and early intervention for childhood defects, diseases, deficiencies and disabilities. The unique feature of the RBSK Services is the continuum of care extending from birth to first 18 years of age. The shortage of specialist manpower like speech therapist and special educator in semi-urban and rural locations is of concern and youngsters should be motivated to take up rehabilitation sciences as a career option.

LIMITATION

This is a hospital based study and not a community

study. So the prevalence of the defects and disabilities in the community cannot be estimated.

Compliance with Ethical Standards

Funding: None

Conflict of Interest: None

References :

1. Christianson A, Christopher P. Howson, Bernadette Modell, The hidden toll of dying and disabled children, March of Dimes Global Report on birth defects. 2006. Available at URL: <https://www.marchofdimes.org/global-report-on-birth-defects-the-hidden-toll-of-dying-and-disabled-children-full-report.pdf>. Accessed on 4th July 2019
2. National Family Health Survey (NFHS-4), 2015-16. Available from: <http://rchiips.org/NFHS/NFHS-4Reports/India.pdf>. Accessed on 4th July 2019
3. Khurmi M, Khanna R, Khera A. First Technical Report of Special Newborn Care Units (SNCUs) in India. 2011. DOI: 10.13140/2.1.1715.3280
4. Operational guidelines Rastriya Bal swasthya karyakram (RBSK) Child Health Screening and Intervention Services under NRHM, Ministry of Health and Family welfare, Feb 2013. Available from: [https://nhm.gov.in/images/pdf/programmes/child-health/guidelines/Rastriya-Bal-Swasthya-Karyakram\(RBSK\).pdf](https://nhm.gov.in/images/pdf/programmes/child-health/guidelines/Rastriya-Bal-Swasthya-Karyakram(RBSK).pdf) Accessed on 4th July 2019
5. Elementary Education in India, 2012, DISE 2010-11: Flash Statistics, NUEPA & DSEL, MoHRD, GOI. and State Report Cards: 2010-11. Available from: <http://www.dise.in/Downloads/Publications/Publications%202010-11/Flash%20Statistics-2010-11.pdf>. Accessed on 4th July 2019
6. Verma IC, Anand NK, Kabra M, Menon PSN, Sharma N. Study of Malformations and Down syndrome in India (SOMDI): Delhi Region. *Ind J Hum Genet*, 1998, 4, 84-87.
7. Rashtriya Bal Swasthya Karyakram. Setting up District Early Intervention Centers- Operational Guidelines. 2019. Available from: <http://nrhmharyana.gov.in/WriteReadData/RBSK/OPERATIONAL%20GUIDELINES%20DEIC.pdf>. Accessed on 5th June 2019.
8. Tiwari J, Jain A, Singh Y, Soni AK. Estimation of magnitude of various health conditions under 4Ds approach, under RBSK Programme in Devendranagar block of Panna District, Madhya Pradesh, India. *Int J Community Med Public Health* 2015;2(3):228-33.
9. Sambo MN, Idris SH, Umar AA, Olorukooba AA. Prevalence of scabies among school-aged children in Katanga rural community in Kaduna state, Northwestern Nigeria. *Ann Nigerian Med* 2012;6:26-9
10. Ganesh J, Kumaravel K S, Balaji J, Rameshbabu B, Nedunchelian K. Clinical profile of children with Severe Acute Malnutrition attending Nutritional Rehabilitation Centre in Dharmapur: *Int J Pediatr Res* 2016; 3(2):95-99.
11. Khalil A, Aggarwal R, Thirupuram S, Arora R. Incidence of congenital heart disease among hospital live births in India. *Indian Pediatr* 1994; 31:519-527.
12. Gupta I, Gupta ML, Parihar A, Gupta CD. Epidemiology of rheumatic and congenital heart disease in school children. *J Indian Medical Assoc* 1992; 90: 57-59.
13. Vashishtha VM, Kalra A, Kalra K, Jain VK. Prevalence of congenital heart disease in school children. *Indian Pediatr*

- 1993; 30: 1337-1340.
14. Sidhu M, Malhi P, Jerath J. Early language development in Indian children: A population-based pilot study. *Ann Indian Acad Neurol.* 2013;16(3):371-375.
 15. Shaywitz SE, Shaywitz BA, Fletcher JM, Escobar MD. Prevalence of reading disability in boys and girls: results of the Connecticut longitudinal study. *J Am Med Assoc* 1990;264(8):998-1002.
 16. Roongpraiwan R, Ruangdaraganon N, Visudhiphan P, Santikul K. Prevalence and clinical characteristics of dyslexia in primary school students. *J Med Assoc Thai.* 2002; 85:1097-1103.
 17. Mogasale VV, Patil VD, Patil NM, Mogasale V. Prevalence of specific learning disabilities among primary school children in a South Indian city. *Indian J Pediatr.* 2012;79:342-7.
 18. Choudhary MG, Jain A, Chahar CK, Singhal AK. A Case Control Study on Specific Learning Disorders in School Going Children in Bikaner City. *Indian J Pediatr.* 2012;79:1477-1481
 19. Berger M, Yule W, Rutter M. Attainment and adjustment in two geographical areas. II-The prevalence of specific reading retardation. *Br J Psychiatry.* 1975;126:510-9.
 20. Poovathinal SA, Anitha A, Thomas R, Kaniamattam M, Melempatt N, Anilkumar A, Meena M. Prevalence of autism spectrum disorders in a semi-urban community in south India. *Ann Epidemiol.* 2016;26:663-5. e668.
 21. Parmar D, Raghunath D, Dixit D, Bansal D, Patidar D. A cross-sectional study to evaluate the functioning and infrastructure of DEIC, and client satisfaction Ujjain and Indore districts established under RBSK. *IOSR Journal of Dental and Medical Sciences.* 2016; 15(09), pp.92-94.
 22. Panigrahy BK, Swain A. A cross-sectional study to evaluate the functioning and infrastructure of mobile health teams and DEIC (District Early Intervention Centre) at Koraput district of Odisha under Rastriya Bal Swasthya Karyakram (RBSK). *World Journal of Pharmaceutical and Medical Research.* 2019; 5: 165-172.