Determinants and health status of under five children according to 4 D's of Rashtriya Bal Swasthya Karyakram in field practice area of rural health training centre

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Abstract

Background: Rashtriya Bal Swasthya Karyakram (RBSK) or 'Child Health Screening and Early Intervention Services' Program was launched by the Ministry of Health and Family Welfare in February 2013, an ambitious program that is aimed to cover 27 crore children in India, was launched. 4 D's identified under RBSK are Defects at birth, Diseases in children, Deficiency conditions and Developmental Delays including Disabilities. Hence the present study was conducted to study the determinants and health status of under 5 children according to 4 D's of RBSK program in field practice area of rural health training centre.
Methods: A cross-sectional community based study was carried out among 400 under 5 children in field practice area of rural health training center of Dept. of Community Medicine of Govt. Medical College, Aurangabad, Maharashtra, India using probability proportionate to size (PPS) sampling technique during the period of Jan. 2017 to Dec. 2018. Data was entered in MS Excel 2007 worksheet and analyzed using open Epi version 3.01
Results: The prevalence of 4 D's condition in under five year children was 18.25%. The association of age and 4Ds condition among under five year children was statistically not significant (p>0.05). Out of complete immunized children, only 7.25% were having 4 D's conditions present among them compared to unimmunized children in which the 4 D's conditions were present in 42.86% and this difference was found statistically significant (p<0.05).
Conclusion: Child Health Screening and promotion of Early Intervention Services is more important for improvement in health status of children. It will also be very helpful in reducing the extent of disability, in improving the quality of life and enabling all persons to achieve their full potential.

Keyword: Determinants of health, Rashtriya Bal Swasthya Karyakram, under five children

Introduction

In India, out of every 100 babies born in this country annually, 6 to 7 have a birth defect [1]. In Indian context, this would translate to 1.7 million birth defects annually and would account for 9.6 per cent of all newborn deaths [2]. Various nutritional deficiencies affecting the preschool children range from 4 percent to 70 percent. Developmental delays are common in early childhood affecting at least 10 percent of the children. These delays, if not intervened timely, may lead to permanent disabilities with regard to cognition, hearing and vision. There are also groups of diseases which are very common in children e.g., dental caries, otitis media and reactive airways diseases which can be cured if detected early [3]. It is understood that early intervention and management can prevent these conditions to progress into more severe and debilitating forms, thereby reducing hospitalization [4].
The Indian Government under the National Rural Health Mission, launched in year 2005, demonstrated a 36%

reduction in under-five mortality rate (U5MR) from 2008 to 2013. In order to reduce morbidity and mortality further, Rashtriya Bal Swasthya Karyakram (RBSK) or 'Child Health Screening and Early Intervention Services' Program was launched by the Ministry of Health and Family Welfare in February 2013, an ambitious program that is aimed to cover 27 crore children in India, was launched. 4 D's identified under RBSK are Defects at birth, Diseases in children, Deficiency conditions and Developmental Delays including Disabilities [5]. Health screening of children is a known intervention under the School Health Program. However, further gains can be achieved by early detection and management of conditions in all age groups. Hence this study was carried out in field practice area of rural health training centre of Dept. of Community Medicine of Govt. Medical College, Aurangabad, India to study the determinants and health status of under 5 children according to 4 D's of RBSK program and identify these condition in rural areas and effects of various determinants of health on these condition so that small interventions made at grass root level can reduce the burden of 4D's.

Health conditions identified for screening: Child Health Screening and Early Intervention Services under NRHM envisage to cover 30 identified health conditions for early detection and free treatment and management [5].

Selected Health Conditions for Child Health Screening & Early Intervention Services	
Defects at Birth	**Deficiencies**
1. Neural tube defect	10. Anaemia especially Severe Anaemia
2. Down's Syndrome	11. Vitamin A deficiency (Bitot spot)
3. Cleft Lip & Palate / Cleft palate aline	12. Vitamin D deficiency (Rickets)
4. Talipes (club foot)	13. Severe Acute Malnutrition
5. Developmental dysplasia of the hip	14. Goiter
6. Congenital cataract	
7. Congenital deafness	
8. Congenital heart diseases	
9. Retinopathy of Prematurity	
Diseases of Childhood	**Developmental delay**
15. Skin conditions (Scabies, fungal infection and Eczema)	21. Vision Impairment
16. Otitis Media	22. Hearing Impairment
17. Rheumatic heart disease	23. Neuro-motor Impairment
18. Reactive airway disease	24. Motor delay
19. Dental conditions	25. Cognitive delay
20. Convulsive disorders	26. Language delay
	27. Behavior disorder (Autism)
	28. Learning disorder
	29. Attention deficit hyperactivity disorder
30. Congenital Hypothyroidism, Sickle cell anemia, Beta thalassemia (Optional)	

Materials and Methods

Study design: It was community based cross-sectional study.

Study area: Field practice area of Rural Health Training Centre (RHTC) of Govt. Medical College, Aurangabad, Maharashtra, India.

Study period: From January 2017 to December 2018 (Two years).

Study population: Children aged between 6 weeks to 5 years residing in the field practice area of Rural Health Training Centre (RHTC) of Govt. Medical College, Aurangabad, Maharashtra.

Ethical consideration: Approval was taken from the Institutional Ethics Committee (IEC).

Sample size: Pilot study was conducted among 30 participants residing in field practice area of RHTC. Out of 30 participants, 3 were found to have 4 D's condition giving 10% as prevalence of 4 D's condition. So by applying the formula $(4pq/L^2)$, with 5% relative precision and 95% confidence interval.

$$n = \frac{4 \times 1.96 \times 1.96 \times 10 \times 90}{5 \times 5} = 138$$

So the sample size derived was approximately 138. But to get maximum possible sample size, assuming 50% proportion of children having various morbidity and with 5% relative precision and 95% confidence interval, by applying the formula $(4pq/L^2)$-

$$n = \frac{4 \times 1.96 \times 1.96 \times 50 \times 50}{5 \times 5} = 384$$

So the sample size 384 which was rounded up to 400 for the study.

Sampling technique: All the participants were selected by simple random sampling method with multi-stage sampling technique. The place where the RHTC is situated is urban area [46]. So the field practice area of rural health and training centre is divided into urban and rural area using stratified sampling method. Rural area under RHTC is divided in to PHC 1 and PHC 2. PHC 1 among field practice area of RHTC was selected randomly. Total study sample size is 400 out of which 200 sample size was taken from urban area and 200 was taken from rural area. As there were total 20 wards in urban area under study, we used probability proportionate to size (PPS) sampling technique to obtain 200 samples from urban area. Similar sampling technique was used to obtain sample size of 200 from rural area under PHC 1. In PHC1 two sub centre were randomly selected. Probability proportionate to size (PPS) sampling technique was used to obtain sample size of 200 from villages under sub centre.

Study tool: After reaching the chosen area, a landmark was identified, then by rotating the bottle, the side which was pointed by mouth of the bottle was selected as a first household and presence of an eligible study participant was ascertained and then each consecutive house was visited in that area, until required sample size fulfilling the inclusion and exclusion criteria were interviewed. The houses which were locked at the time of visit were excluded. After reaching the household, family members were informed about the purpose of the study. A pre-designed pre-tested questionnaire including data regarding demographic information and 4 D's status assessments screening from were used. During 4 D's assessment of health status of under five children, help of RBSK team taken whenever necessary.

Statistical analysis: The data of respondents was collected, compiled and entered in MS Excel 2007 worksheet. It was analyzed using open Epi version 3.01. Percentages were calculated and graphical presentation was used wherever necessary by using Microsoft Office

Excel 2007 software. The proportions were compared using Chi-square test with and without Yate's correction and the level of significance was set at p<0.05.

Results

Table 1: Socio-demographic profile of study population

Sr. No.	Socio-demographic profile	Residence Area		Total
		Urban	Rural	
1.	**Sex**			
	Male	112 (56.00)	104 (52.00)	216 (54.00)
	Female	88 (44.00)	96 (48.00)	184 (46.00)
	Total	200 (100)	200 (100)	400 (100)
2.	**Age**			
	6 weeks to <6 months	14 (07.00)	17 (08.50)	31 (07.75)
	06 to <12 months	11 (05.50)	13 (06.50)	24 (06.00)
	12 to <24 months	32 (16.00)	28 (14.00)	60 (15.00)
	24 to <36 months	40 (20.00)	34 (17.00)	74 (18.50)
	36 to <48 months	48 (24.00)	43 (21.50)	91 (22.75)
	48 to 60 months	55 (27.50)	65 (32.50)	120 (30.00)
	Total	200 (100)	200 (100)	400 (100)
3.	**Religion**			
	Hindu	128 (64.00)	123 (61.50)	251(62.75)
	Muslim	43 (21.50)	37 (18.50)	80 (20.00)
	Buddhist	29 (14.50)	40 (20.00)	69 (17.25)
	Total	200 (100)	200 (100)	400 (100)
4.	**Socio-economic status**			
	I (Upper class)	12 (06.00)	05 (02.50)	17 (04.25)
	II (Upper middle class)	34 (17.00)	08 (04.00)	42 (10.50)
	III (Middle class)	112 (56.0)	62 (31.00)	174 (43.50)
	IV (Lower middle class)	23 (11.50)	87 (43.50)	110 (27.50)
	V (Lower class)	19 (09.50)	38 (19.00)	57 (14.25)
	Total	200 (100)	200 (100)	400 (100)

It was seen from Table 1 that socio-demographic profile of the study population. Out of 400 participants, 200 were from urban area and 200 were from rural area. Out of 200 from urban area, 112(56.00%) were male and 88(44.00%) were female. Similarly out of 200 from rural area, 104(52.00%) were male and 96(48.00%) were female. Maximum number of study subjects were of Hindu religion 251(62.75%), followed by Muslim 80(20%) and 69 were Buddhist (17.25%) religion. Distribution of socio-economic status shows in urban area maximum number of family belong to middle class 56%, followed by upper middle class 34(17%). Upper class family were 06% only. Lower middle class and lower class family were 23(11.50%) and 19(9.50%) respectively. Similarly in rural area maximum number of family belong to lower middle class 87 (43.50%) followed middle class 62(31%). Upper class family were 2.50% and upper middle class were 8 (4%) only. lower class family were 38 (19%).

Table 2: Health status assessment of study population

Sr. No.	Assessment status	Urban	Rural	Total	p-value
1	4 D's conditions-Present	28 (14.00)	45 (22.50)	73 (18.25)	$\chi 2$ = 4.843
2	4 D's conditions-Absent	172 (86.00)	155 (77.50)	327 (81.75)	df=1
3	Total	200 (100)	200 (100)	400 (100)	p=0.02776

As Table 2 shows that the health status assessment of 4 D's condition of under 5 children was present in 73(18.25%), while among 327(81.75%) was absent. The association between those was found statistically significant (p=0.02776).

Table 3: Distribution of study population according to 4 D's conditions present

4 D's Conditions Present	Urban	Rural	Total
1. Defects at Birth			
Cleft lip/Cleft Palate	01 (100)	00 (00.00)	01 (100)
Congenital Heart Diseases	00 (00.00)	01 (100)	01 (100)
Total	01 (50.00)	01 (50.00)	02 (100)
2. Deficiencies			
Severe Acute Malnutrition	09 (37.50)	15 (62.50)	24 (100)
3. Childhood Diseases			
Skin conditions (Scabies, fungal infection & eczema)	05 (31.25)	11(68.75)	16 (100)
Otitis Media	01 (50.00)	01(50.00)	02 (100)
Reactive airway disease & pneumonia	05 (41.67)	07 (58.33)	12(100)
Diarrhea	04 (44.44)	05 (55.56)	09 (100)
Dental Caries	01(50.00)	01(50.00)	02(100)
Convulsive Disorders	01(50.00)	01(50.00)	02(100)
Total	17 (39.53)	26 (60.47)	43 (100)
4. Developmental Delays & Disabilities			
Vision Impairment	01 (50.00)	01 (50.00)	02(100)
Hearing Impairment	00 (00.00)	01100	01 (100)
Language Delay	00 (00.00)	01100	01 (100)
Total	01 (25.00)	03 (75.00)	04 (100)
Grand Total of 4Ds	28 (38.36)	45 (61.64)	73 (100)

It was evident from Table 3 that total 73 under five children were having various 4 D's conditions. Out of 73 4 D's conditions, 28(38.36%) conditions were present in urban area and 45(61.64%) were present in urban area. Total 2 defects at birth is seen 01(50%) in rural area and 01(50%) in urban area. Severe acute malnutrition was seen in 24 under five children. Out of which 9(37.50%) were in urban area and 15(62.50%) were in rural area. Childhood diseases were seen in 43 under five children out of which 17(39.53%) were seen in urban area and 26(60.47%) were seen rural area. Developmental Delays & Disabilities condition seen in 4 under five children out of which 1 condition was seen urban area and 3 conditions were from rural area.

Table 4: Association between socio-demographic profile & health status of study population

Socio-demographic profile	Health status		Total	p-value
	4 D's condition Present	4 D's condition Absent		
1. Age of child				
6 wks to <6 months	02 (06.45)	29 (93.55)	31 (100)	$\chi 2 = 4.338$ df=5, p=0.5018
06 to <12 months	04 (16.67)	20 (83.33)	24 (100)	
12 to <24 months	09 (15.00)	51 (85.00)	60 (100)	
24 to <36 months	14 18.92)	60 (81.08)	74 (100)	
36 to <48 months	19 (20.88)	72 (79.12)	91 (100)	
48 to 60 months	25 (20.83)	95 (79.17)	120 (100)	
Total	73 (18.25)	327 (81.75)	400(100)	
2. Religion				
Hindu	37 (14.74)	214 (85.26)	251 (100)	$\chi 2 = 7.999$ df=2, p= 0.018320
Muslim	23 (28.75)	57 (71.25)	80 (100)	
Buddhist	13 (18.84)	56 (81.16)	69 (100)	
Total	73(18.25)	327(81.75)	400 (100)	
3. Type of family				
Nuclear	21 (11.86)	156 (88.14)	177 (100)	$\chi 2 = 17.78$

Joint	25 (17.48)	118 (82.52)	143 (100)	df=2,
Three generation	27 (33.75)	53 (66.25)	80 (100)	p= 0.0001380
Total	73(18.25)	327(81.75)	400(100)	

4. Sex				
Male	30 (15.00)	170 (85.00)	200 (100)	χ^2 = 2.832
Female	43 (21.50)	157 (78.50)	200 (100)	df=1,
Total	73 (18.25)	327 (81.75)	400(100)	p= 0.09243
5. Socio-economic status				
I (Upper class)	02 (11.76)	15 (88.24)	17 (100)	
II (Upper middle class)	08 (19.05)	34 (80.95)	42 (100)	
III (Middle class)	17 (09.77)	157 (90.23)	174 (100)	χ^2 = 2.832
IV (Lower middle class)	20 (18.18)	90 (81.82)	110 (100)	df=4,
V (Lower class)	26 (45.61)	31 (54.39)	57 (100)	p =0.0000143
Total	73 (18.25)	327 (81.75)	400 (100)	

(Figures in parenthesis denote row percentages)

As evident from Table 4 that the prevalence of 4 D's condition in under five year children was 18.25%. The association of age and 4 D's condition among under five year children was statistically not significant (p>0.05). 4 D's condition was more prevalent in Muslim 28.75% followed by Buddhist 18.84%. The association of religion and 4 D's condition among under five year children was found statistically significant (p<0.05) with more prevalence in Muslim religion. 4 D's condition was more prevalent in three generation family (33.75%) followed by 17.48% in joint family and association of type of family and 4 D's condition among under five year children was found statistically significant (p<0.05). 4 D's condition was more prevalent in female than male however it was not statistically significant (p>0.05). 4 D's condition was more prevalent in lower socio-economic status and was found statistically significant (p<0.05).

Table 5: Association of determinants of health and 4 D's conditions of study population

Determinants of Health	4 D's Condition		Total	p-value
	Present	Absent		
1. Exclusive breastfeeding				
Practiced	22 (09.65)	206 (90.35)	228(100)	χ^2= 35.33
Not practiced	49 (34.75)	92 (65.25)	141(100)	df=1
Total	71 (19.24)	298 (80.76)	369 (100)	p=<0.0000001
2. Immunization status				
Complete immunized	20 (07.25)	256 (92.75)	276 (100)	
Partially immunized	50 (42.74)	67 (57.26)	117 (100)	χ^2= 72.26
Un-immunized	03 (42.86)	04 (57.14)	07 (100)	df=2
Total	73 (18.25)	327 (81.75)	400 (100)	p=<0.0000001
3. Environmental health indicators-Piped water supply				
Yes	42 (12.00)	308 (88.00)	350 (100)	χ^2= 73.31
No	31 (62.00)	19 (38.00)	50 (100)	df=1
Total	73 (18.25)	327 (81.75)	400 (100)	p=<0.0000001
4. Environmental health indicators-Latrine availability at home				
Yes	46 (18.78)	199(81.22)	245 (100)	χ^2= 0.117
No	27 (17.42)	128 (82.58)	155 (100)	df= 1
Total	73 (18.25)	327 (81.75)	400 (100)	p=0.7323
5. Environmental health indicators-Domestic waste disposal to open space				
Yes	42 (18.58)	184 (81.42)	226 (100)	χ^2= 0.03886
No	31(17.82)	143 (82.18)	174 (100)	df= 1
Total	73 (18.25)	327 (81.75)	400 (100)	p = 0.8437

It was seen from Table 5 that those children were exclusively breastfeed, only 9.65% were having 4 D's conditions compared to 90.35% children who were not exclusively breastfeed and 4 D's prevalence among was 90.35% and this difference was statistically significant (p<0.05).
Similarly out of completely immunized children only 7.25% were having 4 D's conditions present among them compared to unimmunized children in which the 4 D's conditions were present in 42.86% children & this difference was found statistically significant (p<0.05). Similarly those under five children family having piped water supply, prevalence of 4 D's among their child was 12% compared to those not having piped water supply

having 4 D's prevalence 88% and this difference was statistically significant (p<0.05). 4 D's condition were prevalent in 18.78% under five children, whose family having latrine at home and prevalent in 17.42% under five children whose family not having latrine at home. This difference was not found statistically significant (p>0.05). 4Ds condition were prevalent in 18.58% under five children whose family disposing domestic waste to open space in front of their home and prevalent in 17.82% under five children whose family not disposing domestic waste to open space in front of their home. This difference was not found statistically significant (p>0.05).

Discussion

In our study, out of 73 4 D's conditions, 28(38.36%) conditions were present in urban area and 45(61.64%) were present in urban area. Total 2 defects at birth is seen 1(50%) in rural area and 1(50%) in urban area. Severe acute malnutrition was seen in 24 under five children, out of which 9(37.50%) were in urban area and 15(62.50%) were in rural area. Childhood diseases were seen in 43 under five children, out of which 17(39.53%) were seen in urban area and 26(60.47%) were seen rural area. Developmental Delays & Disabilities condition seen in 4 under five children, out of which 1 condition was seen urban area and 3 conditions were from rural area. Similarly study by Tiwari J et al. [4] conducted in Devendranagar block of Panna District, Madhyapradesh found that out of total 26977 children screened, 53 children were found to have birth defects, 434 children were found to have some kind of deficiency, 21768 children were found to have diseases and 113 children were found with developmental delay including disabilities.

Similarly other studies by Kurane AB et al. [5] and Rajeev SV et al. [6] found that 10% and 12% prevalence of 4 D's conductions in immunized children as compared to 52% in unimmunized children respectively. Also National Family Health Survey (NFHS-4) [7] State Fact Sheet Maharashtra. 2015 shows similar pattern.

In the present study, those children were exclusively breastfeed, only 9.65% were having 4 D's conditions compared to 90.35% children who were not exclusively breastfeed and 4 D's prevalence among was 90.35% and this difference was statistically significant (p<0.05). Similarly National Family Health Survey (NFHS -4)[7] conducted in 2015-16 data showed that 56.6% of 0-6 months infants were exclusively breastfed in Maharashtra state and District Level Health Survey (DLHS-4) [8] of Maharashtra in 2012-13 data showed that 70.0% of 0-5 months infants were exclusively breastfed. Another study by Rokade H et al. [9] conducted in urban slum areas in Solapur city showed that out of total 200, 14% mothers received advice on breastfeeding during ANC. 55% babies received demand feeding. Breastfeeding feeding practices were appropriate in 64% of PNC women. A study by Adhikari D et al. [10] revealed that a majority (88.5%) of the mothers were breast feeders. However, merely 27% of the mothers were exclusive breast feeders.

In this study, out of completely immunized children only 7.25% were having 4 D's conditions present among them compared to unimmunized children in which the 4 D's conditions were present in 42.86% children & this difference was found statistically significant (p<0.05). Similarly Kadri AM et al. [11] conducted a cluster survey based on probability proportion to size advocated under multi-indicator cluster survey by WHO in the

urban slums of Ahmedabad found that, the coverage rate for all the vaccines was slightly higher among males as compared to females. 70.3 per cent of the children were fully immunized and immunization coverage was found to be more among the males as compared to females though the difference was found to be statistically insignificant. Another study by Rajeev SV and Radhamani KV [6] conducted among Anganwadi children between ages 2 to 5 years at Cheruthazham in rural area of north Kerala found that 94% of children were fully immunized. The major cause of incomplete immunization was postponement of immunization due to inter current illness of the child. There is only marginal difference in immunization coverage according to gender, religion or education of parents. Another study by Sunila S et al. [12] conducted on children attending services of rural hospital in Raigad district showed that out 303 children 57 were found partially immunized and 10.33% unimmunized. Lack of knowledge (36%), lack of priority for immunization (33%) were major reasons and 80% mothers don't have correct knowledge about on immunization schedule.

In our study, the prevalence of skin diseases was 16%, Pneumonia 12%, Diarrhoea 9%, Otitis media infection 2% and severe acute malnutrition 24%. Similarly Adhikari D [10] conducted cross sectional study in Dharan municipality in Nepal showed that the morbid conditions founded in the study were related to skin diseases 85%, ear infection 25%, enlarged lymph node 5%, Pneumonia 25%, Diarrhoea/vomiting 50%, abdominal enlargement 12.5% and malnutrition 45%.

Conclusion

With this study we observe that still there are many children are undiagnosed and deprived of treatment for curable diseases. And this hidden part of children with defects, diseases or deficiencies constitutes a major part in child mortality. Any effective health intervention will reduce both direct costs and out-of-pocket expenditure and here, Child Health Screening and promotion of Early Intervention Services is more important for improvement in health status of children. It will also be very helpful in reducing the extent of disability, in

improving the quality of life and enabling all persons to achieve their full potential. The beautiful feature of the RBSK Services is the continuum of care extending over different phases of the life of a child over the first 18 years. And in future days we sincerely hope that it will be further extended to cover all the children of the community through National Health Mission.

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