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RESEARCH ARTICLE

DEVELOPMENTAL MILESTONES OF INFANTS ADMITTED TO FACILITY BASED NEWBORN CARE UNIT: A CASE CONTROL STUDY.

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Abstract

Introduction:- Facility based new born care has been identified in treating sick child and providing support to low birth weight babies immediately after birth. This care is crucial in determining the child survival. Developmental milestones act as check points in a child's development to determine what the average child is able to do at a particular age. Facility based care includes essential care at birth and care of sick babies which helps infants to grow at normal rate and live a healthy life. This study was an attempt to compare normal infants and infants admitted in FBNC units.

Methodology:- The present study was undertaken to evaluate the developmental milestones of infants admitted in Facility based new born care also called Special New Born Care Unit at the time of birth, in Sawai Madhopur District. Data for infants born were taken from ASHA and AWW by investigators. The total infants tracked for the study were 2888, 1444-admitted to FBNC and 1444 from normal population were matched for age and gender from the same village. An Interview schedule was formulated to collect general information. Information related to developmental milestones like age of social smiling, neck holding, standing etc were recorded.

Results: - The results of the study indicate that there was no significant difference in the 2 groups (FBNC and Normal) with regard to cognitive development. Ninety percent infants in both groups gave social smile at one month, neck holding at 3 months was seen in around 37 % in both groups, standing with support at 9 months was seen in 22 % infants and 4 % infants at 1 year, similarly speaking monosyllables at 9 months was around 20 % and at 1 year it was 4 % in both the groups. Although there was no significant difference between the 2 groups but with regard to cognitive development the indicators were not up to the acceptable standard of development according to age.

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Introduction:-

Every year 70 percent of neonatal deaths take place because simple yet effective interventions do not reach those who need them most. Every year, majority of child deaths in India occur during the newborn period (within first 28 days after birth) with a neonatal mortality rate (NMR) of 32 per 1000 live births in 2011 (CHERG,2012). Thirty five percent of newborn deaths are caused by complications of premature birth with surviving newborns facing a lifetime of disability, including learning disabilities, visual and hearing problems. Birth complications and septicemia contributes 23% each towards new-born mortality. These three causes together contribute 80% of total mortality in

newborns. (Ministry of Health and Family Welfare Annual Report 2013-14). Health experts agree that the Millennium Development Goal to reduce child mortality by two-thirds between 1990 and 2015 cannot be reached unless neonatal mortality is halved.

As per the Executive summary of the Lancet neonatal survival series (2005), intervention coverage is low, progress of scaling up is slow, and inequity is high. The gap is due to poor coverage within the health system, shortage of health care providers, and issues related to access to referral services. About 70% of all the 4 million newborns that die each year can be saved by low cost, low-tech interventions. During the last two decades, newborn survival has gained global attention and various efforts have been undertaken by governments to improve newborn health and reduce mortality.

‘Facility based neonatal care’ is an attempt by the Government of India to strengthen the neonatal care provision. Facility based care includes essential care at birth and care of sick babies in different facilities. Stratification of various levels according to the ability of the units to handle cases has been devised. While it is desirable to see babies receiving care with appropriate facilities, designing such a model and operationalizing it within the health system is a challenge.

Facility based neonatal care consists of newborn care undertaken in a health facility/hospital and includes Essential Newborn Care (ENC) immediately after delivery (drying and wrapping of baby, thermal control, initiating early breastfeeding, resuscitation for babies unable to breathe and monitoring the baby till discharge from hospital). If danger signs are detected in hospital or after discharge, baby requires sick newborn care which includes antibiotics for sepsis and other infections, fluid management, treatment of jaundice and respiratory distress. Such babies need strict monitoring round the clock and have to be referred to a higher centre if there are no signs of improvement (Pandya, 2013).

Developmental milestones also act as check points in a child’s development to determine what the average child is able to do at a particular age. It helps in identifying potential problems with delayed development. Developmental milestones are behaviours or physical skills seen in infants and children as they grow and develop. Rolling over, crawling, walking and talking at the right age are all considered developmental milestones. Facility based care includes essential care at birth and care of sick babies in different facilities which helps infants to grow at normally and live a healthy life. The present study is an attempt to compare normal infants and infants admitted in FBNC to identify whether the infants are leading a life with normal developmental milestones or are they lagging behind and to check the child survival rate.

Methodology:-

The present study was undertaken to evaluate the status of infants admitted in Special New Born Care Unit (SNCU) / FBNC (Facility Based New Born Care Units) at the time of birth, in Sawai Madhopur District of Rajasthan.

Sampling Method: - New born admitted to SNCU over a period of one year were included in the study. The other group comprised of normal children born during the same time was selected from the respective villages for comparisons. An Interview schedule was formulated to collect information on birth weight and information related to developmental milestones like age of social smiling, neck holding, standing etc.

Sample Selection and Sample Size:- Data of infants born and admitted to FBNC/ SNCU over a period of one year were taken from district hospital, Sawai Madhopur. ASHA Sahyogini and AWW were approached to locate infant and then the information on child was collected from their families. The status of infant at birth was taken from hospital records and data on children born during the same time in same villages was collected from ASHA and AWW to match as controls. The data was matched for age, sex and caste for control. A total number of infants tracked included 2888 infants, 1444 each- admitted to FBNC and from normal population from the same village from Sawai Madhopur District of Rajasthan.

Results and discussion:-

The FBNC is an approach to improve the status of newborn health in the country. It is in some way contributing to child survival therefore Newborn Care Corners (NBCCs) are established at delivery points to provide essential newborn care, while Special Newborn Care Units (SNCUs) at District and Newborn Stabilization Units (NBSUs) at Primary Health Centre (PHC) provide care for sick newborns.

The results from present study indicate that out of 2888 infants, very low birth weight babies were 4 % in FBNC group whereas there were no very low birth weight babies in the normal group. Low birth weight babies were around 55 % in FBNC group and 58 % in normal babies. This percent is too high in both the groups. Babies with normal weight were around 41 % in both the groups. This data is very alarming as only 40 % babies were born with normal weight (Table 1).

Table No. 1: -

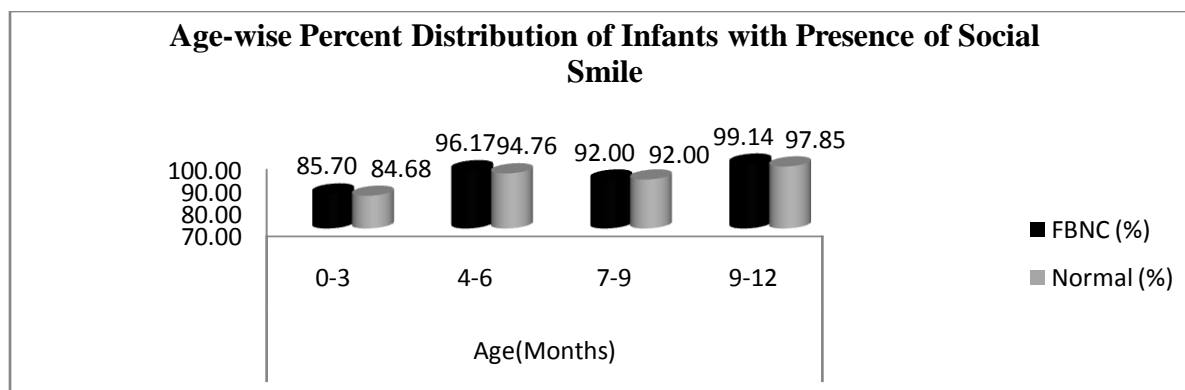
Percent Distribution of Children as per Their Birth Weights		
	FBNC (1444)	Normal (1444)
<1.5 kg	4.24 (61)	0.00 (0)
1.5-2.5 kg	54.65 (789)	58.33 (842)
>2.5 kg	41.11 (594)	41.67 (602)
* Figure in parentheses denotes numbers		
chi-square = 106.04, df=2, HS at p<0.001		

Data on pre term births were also recorded and it was found that between the two groups the number of pre- term infants was higher in FBNC group; around 32 infants had born prematurely whereas in normal group only 0.7 % infants had a pre term birth. The difference between the 2 groups was highly significant statistically.

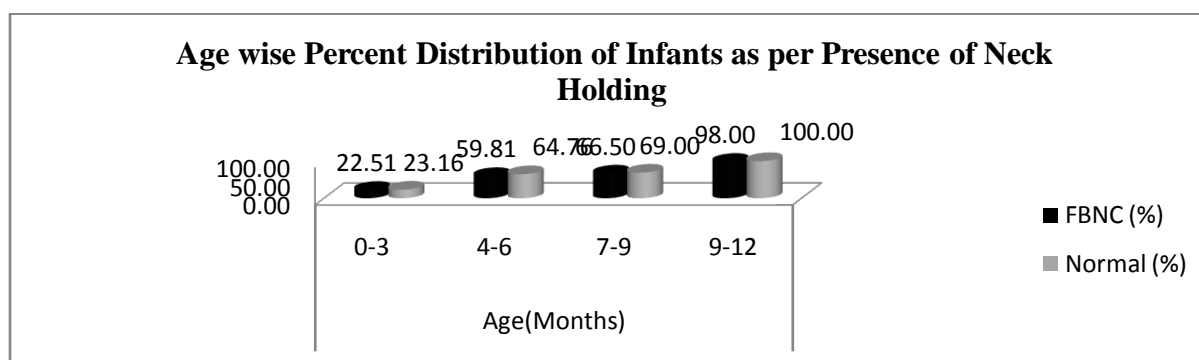
Table No. 2: -

Percent Distribution of Infants as per Developmental milestones				
	FBNC (1444)	Normal (1444)	Chi-Square(df =1)	Relationship
Social Smile (at 1 month)	90.30 (1304)	89.54 (1293)	0.042	NS
Neck Holding (at 3 month)	36.70 (530)	37.67 (544)	0.068	NS
Standing with support (at 9 month)	21.88 (316)	22.30 (322)	0.012	NS
Speaking monosyllables (at 9 month)	19.88 (287)	20.29 (293)	0.012	NS
Standing with support (at 1 year)	3.95 (57)	4.57 (66)	0.028	NS
Speaking monosyllables (at 1 year)	4.09 (59)	3.88 (56)	0.003	NS
* Figure in parentheses denotes numbers				

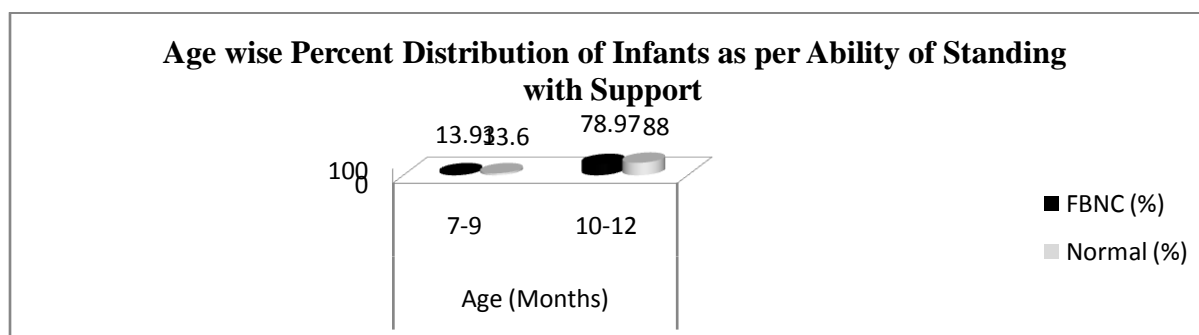
The indicators for developmental milestones is given in table 2, since it is a follow up study it was observed that there was no significant difference in the 2 groups (FBNC and Normal) with regard to developmental indicators. Ninety percent infants in both groups gave social smile at one month, neck holding at 3 months was seen in around 37 % in both groups, standing with support at 9 months was seen in 22 % infants and 4 % infants at 1 year, similarly speaking monosyllables at 9 months was around 20 % and at 1 year it was 4 % in both the groups. Although there was no significant difference between the 2 groups but with regard to development the indicators were not up to the acceptable standard of development according to age.

**Figure 1:-**

Comparative data of FBNC versus Normal group infants on basis of presence of social smile suggests that slightly higher proportion of FBNC group infants fulfilled this development criterion. Social smile was not found to be age dependent with the chi-square value being 1.62, df=3 ($p < 0.05$).

**Figure 2:-**

Seven to nine months old infants in both groups approximately 70 % showed presence of neck holding.

**Figure 3:-**

In the age group of 10-12 months 88% children were able to stand with support in comparison to 78.97% children from FBNC group. In both the groups, FBNC ($\chi^2 = 44.70$, df=1) and Normal ($\chi^2 = 45.13$, df=1) age and ability to stand with support were found to have highly significant association at $p < 0.001$. When association between the two variables was calculated within the two groups it was found to be non-significant ($\chi^2 = 0.0045$, df=1) at 1% significance level.

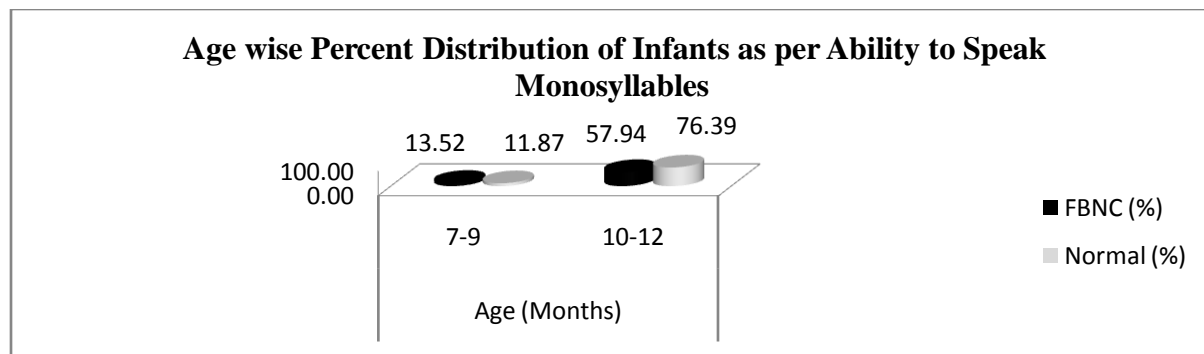


Figure 4:-

Ability to speak monosyllables was found to present in greater percent of children in the age group 10-12 months as compared to children in 7-9 months. Percentage of children from Normal group (76.39%) speaking monosyllables was high. Ability to speak monosyllables was found to significantly dependent on age ($\chi^2 = 0.0045$, $df = 1$) at 5% significance level.

Discussion:-

Developmental milestones are specific skill attainments occurring in a predictable sequence over time, reflecting the interaction of the child's developing neurological system with the environment. Skills can be grouped in sectors of development: gross motor, fine motor (including self-care), and communication (speech, language and nonverbal), cognitive and social-emotional (Dosman, Andrews, and Goulden, 2012).

Developmental screening is both effective and feasible if potential barriers are addressed adequately (Schonwald *et al.*, 2009). The future of human societies depends on children being able to achieve their optimal physical and psychological development. Developmental delay is failure to acquire age-appropriate functionality. It may involve one or more streams of development. Responsive parenting has potential to promote better development (Aly, Taj and Ibrahim, 2010). Early identification of children with developmental delays or at risk of delay allows for referral to early intervention services, which have been shown to improve developmental and behavioral outcomes (Bailey *et al.*, 2005, Anderson *et al.*, 2003, Berlin *et al.*, 1998). The first years of life provide a window of opportunity in which the structure and the foundation of the functioning brain are established. Failure to provide optimal health and developmental stimulation in the early years of life may have serious implications throughout the life course (Bailey, Skinner, Warren, 2005). The windows represent normal variation in ages of milestone achievement among healthy children. They are recommended for descriptive comparisons among populations, to signal the need for appropriate screening when individual children appear to be late in achieving the milestones, and to raise awareness about the importance of overall development in child health (WHO, 2006a). Later acquisition of infant developmental milestones was associated with lower subsequent IQ (Flensburg-Madsen and Mortensen, 2015).

Barriers to screening that have been identified previously include lack of clinician knowledge and training, lack of adequate reimbursement for conducting screening, and the need to develop clinical workflow plans carefully (Earls and Hay, 2006). Primary health physicians are in the best arrangement to provide this assistance as they can monitor child's development longitudinally and understand the child's developmental trajectory better. Current strategy employed by majority of primary-care providers to monitor the trajectory is termed 'developmental surveillance'. It is "a flexible, continuous process whereby knowledgeable professionals perform skilled observations of children during the provision of health care" (Aly, Taj and Ibrahim, 2010).

Facility Based Newborn Care (FBNC) is one of the key components under the National Rural Health Mission to improve the status of newborn health in the country. A continuum of newborn care has been established with the launch of home based and facility based newborn care components ensuring that every newborn receives essential care right from the time of birth and first 48 hours at the health facility and then at home during the first 42 days of life. Newborns identified as sick or preterm /low birth weight soon after birth or during home visit are referred to special newborn care facilities for further management and long term follow up after discharge (Ministry of Health and Family Welfare Annual Report, 2013-14). In the present study it was seen that despite of the illnesses and poor health status at birth, FBNC children were on the same ladder at almost same ages. This explains the correct monitoring of children health problems which made them stand at same age as the normal children had.

Comparison of a child's current developmental skills to milestone data remains the most frequently reported method of developmental surveillance for physicians in practice, in conjunction with the clinical assessment and the physical examination of the child (Sices *et al.*, 2003 and Sand *et al.*, 2005).

As per WHO Multicentre Growth Reference Study, longitudinal data collected to describe the attainment of six gross motor milestones by children aged 4 to 24 months in Ghana, India, Norway, Oman and the USA, (N=816) children and reported that around 90% of children achieved five of the milestones following a common sequence, and 4.3% did not exhibit hands-and-knees crawling. The six windows have age overlaps but vary in width; the narrowest is sitting without support (5.4 mo), and the widest are walking alone (9.4 mo) and standing alone (10.0 mo). The estimated 1st and 99th percentiles in months are: 3.8, 9.2 (sitting without support), 4.8, 11.4 (standing with assistance), 5.2, 13.5 (hands-and-knees crawling), 5.9, 13.7 (walking with assistance), 6.9, 16.9 (standing alone) and 8.2, 17.6 (walking alone) (WHO, 2006a).

According to WHO (2006b), there is little or no relationship between physical growth and motor development in the population studied. The literature indicates that growth retardation is related to delayed motor development, perhaps because of common causes such as nutritional deficiencies and infections, but in healthy children, as found size and motor development are not linked.

In the current study, it was observed that infants in this particular region were not faring well in the developmental indicators. The data for survival indicated that maximum infants from the FBNC group died at 1 month of age (25), at 3, 6 and 9 months also some deaths were reported in the FBNC group (18,13,13), but in normal population no such deaths were reported. This shows that although infants in the FBNC presented with equivalent status developmental indicators but somehow they were still more vulnerable and hence deaths in them were observed.

Conclusion:-

It can be concluded that children admitted to FBNC are neither ahead of normal children nor they are lagging in developmental milestones comparatively. FBNC is a step forward which is providing critical life care during critical stages which is beneficial in order to improve child survival.

References:-

1. CHERG (2012).Committing to Child Survival: A Promise Renewed. Progress Report. Retrieved from http://www.unicef.org/videoaudio/PDFs/APR_Progress_Report_2012_final.pdf
2. Annual Report to the people on Health (2010). Retrieved from <http://mohfw.nic.in/WriteReadData/1892s/9457038092AnnualReportthealth.pdf> ||
3. Darmstadt,G.L. *et al.* (2005). Evidence-based, Cost-effective Interventions: How many newborns can we save?Lancet,365(9463),977-988with updates from http://www.who.int/pmnch/topics/part_publications/essential_interventions_18_01_2012.pdf. ||
4. FBNC (2011). Facility based Newborn Care Operational Guidelines. Retrieved from [http://www.nihfw.org/pdf/Facility%20Based%20Newborn%20Care%20\(FBNC\)%20Operational%20Guide%20Guidelines%20for%20Planning%20and%20Implementation.pdf](http://www.nihfw.org/pdf/Facility%20Based%20Newborn%20Care%20(FBNC)%20Operational%20Guide%20Guidelines%20for%20Planning%20and%20Implementation.pdf)
5. F-IMNCI (2009). Facility Based IMNCI Participants Manual. Retrieved from http://www.unicef.org/india/FBC_Participants_Manual.pdf ||
6. HBNC (2011). Home Based Newborn care Operational Guidelines. Retrieved from <http://www.jkhealth.org/notifications/carebal.pdf> || IPHS-Indian Public Health Standards. Retrieved from <http://www.nrhm.gov.in/about-nrhm/guidelines/indian-public-health-standards.html> ||
7. Pandya.H. (2013). Initiatives to Improve Newborn Health in India Progress in the Last Two Decades. PARIPEX Indian Journal of Research. **Vol : 2 | Issue : 7 | July 2013 ISSN - 2250-1991**
8. Iyengar, S.D. *et al.* (2008). Child Birth Practices in Rural Rajasthan: Implications for neonatal health and survival. Journal of Perinatology. 28, S23-30. Retrieved from <http://www.nature.com/jp/journal/v28/n2s/abs/jp2008174a.html?message=remove&-free=2> |
9. JSSK (2011). Janani-Shishu Suraksha Karyakram. Retrieved from <http://meghealth.nic.in/nrhm/jssk.html> || MDG-4:Reduce Child Mortality, Millennium Development Goals. Retrieved from <http://www.un.org/millenniumgoals/childhealth.shtml> ||
10. NIPI (2008). Norway India Partnership Initiative. Intervention-Yashoda. Retrieved from http://www.nipi.org.in/items/Resources_OtherPublications_BrochureYashoda.pdf ||

11. NIPI (2009). Norway India Partnership.Home Based Post Natal Care(HBPNC). Retrieved from http://www.nipi.org.in/Items/Resources_OtherPublications_BrochureHBPNC.pdf |
12. NNF. (2004). State of India's Newborns: Save the Children. Retrieved from | <http://www.healthynewbornnetwork.org/sites/default/files/resources/India-SOIN.pdf> | |
13. NRHM (2005). National Rural Health Mission. Retrieved from <http://nrhm.gov.in/> | |
14. NSSK (2009). Navjaat Shishu Suraksha Karyakram: Basic New Born Care and Resuscitation Program Training Manual. Retrieved from <http://www.nihfw.org/pdf/NCHRC-Publications/NavjaatShishuTrgMan.pdf> | |
15. The Executive Summary of The Lancet Neonatal Survival Series (2005). The Problem of New Born Deaths. Retrieved from: http://www.who.int/maternal_child_adolescent/documents/pdfs/lancet_neonatal_survival_exec_sum.pdf.
16. The State of World's Children, 2009 : Maternal and newborn health. Retrieved from <http://www.unicef.org/protection/SOWC09-FullReport-EN.pdf> .
17. WHO/UNICEF Joint Statement (2009). Home visits for the Newborn Child: A Strategy to improve survival. Retrieved from http://www.unicef.org/health/files/WHO_FCH_CAH_09.02_eng.pdf.
18. Ministry of Health and Family Welfare Annual Report (2013-14) Department of Health and Family Welfare, Ministry of Health and Family Welfare, Government of India
19. Registrar General of India- Sample Registration System, RGI-SRS (2014) "Decline in Rates of Maternal and Infant Mortality" Press Information Bureau, ministry of Health and family welfare, Government of India. Retrieved from <http://pib.nic.in/newsite/printrelease.aspx?Relid=103446>
20. WHO, (2006a). Motor Development Study: Windows of achievement for six gross motor development milestones, WHO Multicentre Growth Reference Study Group. *Acta Pædiatrica*, 2006; Suppl 450: 86_/95
21. Flensburg-Madsen T, Mortensen EL (2015). Infant developmental milestones and adult intelligence: A 34-year follow-up. *Early Hum Dev*. 2015 Jul;91(7):393-400.
22. Dosman CF, AndrewsD, and Goulden KJ, (2012), Evidence-based milestone ages as a framework for developmental surveillance, *Paediatr Child Health*. 2012 Dec; 17(10): 561–568.
23. Aly Z, Taj F, Ibrahim S,(2010) Missed opportunities in surveillance and screening systems to detect developmental delay: A developing country perspective. *Brain Dev*. 2010 Feb;32(2):90-7.
24. Bailey DB, Jr, Hebbeler K, Spiker D, Scarborough A, Mallik S, Nelson L. Thirty-six-month outcomes for families of children who have disabilities and participated in early intervention. *Pediatrics*. 2005;116:1346–1352.
25. Anderson LM, Shinn C, Fullilove MT, *et al*. The effectiveness of early childhood development programs. A systematic review. *Am J Prev Med*. 2003;24 (3 Suppl):32–46.
26. Berlin LJ, Brooks-Gunn J, McCarton C, McCormick MC. (1998) The effectiveness of early intervention: examining risk factors and pathways to enhanced development. *Prev Med*. 1998;27:238–245. [PubMed]
27. Sices L, Feudtner C, McLaughlin J, Drotar D, Williams M. (2003) How do primary care physicians identify young children with developmental delays? A national survey. *J Dev Behav Pediatr*. 2003;24:409–417.
28. Sand N, Silverstein M, Glascoe FP, Gupta VB, Tonniges TP, O'Connor KG. Pediatricians' reported practices regarding developmental screening: do guidelines work? Do they help? *Pediatrics*. 2005;116:174–179.
29. Bailey DB, Skinner D, Warren SF. (2005) Newborn screening for developmental disabilities: reframing presumptive benefit. *Am J Public Health* (2005) 95:1889–93.10.2105/AJPH.2004.051110.
30. Jacob Urkin, Yair Bar-David, and Basil Porter. (2015), Should We Consider Alternatives to Universal Well-Child Behavioral-Developmental Screening? *Front Pediatr*. 2015; 3: 21.
31. Earls MF, Hay SS. (2006). Setting the stage for success: implementation of developmental and behavioral screening and surveillance in primary care practice—the north Carolina assuring better child health and development (ABCD) project. *Pediatrics*. 2006;118(1):e183–188.
32. Schonwald A, Huntington N, Chan E, Risko W, Bridgemohan C. (2009). Routine developmental screening implemented in urban primary care settings: more evidence of feasibility and effectiveness. *Pediatrics*.2009;123:660–668.
33. WHO (2006b). Multicentre Growth Reference Study Group. Relationship between physical growth and motor development in the WHO Child Growth Standards. *Acta Paediatr Suppl* 2006;/ 450:/96_/101.