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The Gross Motor Function Measure A Mean To Evaluate The Impact Of Gross Motor Function Measures In Infant 0-3 Months.

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Abstract

Background : The aim of this study was to investigate the impact of the Gross Motor Function Measure (GMFM) on infants aged 0-3 months, focusing on its utility as a means of evaluating gross motor function during this critical developmental period. The discussion will delve into key findings, implications for clinical practice, methodological considerations, and avenues for future research. Our study revealed correlation between the joint movements. Comparing our results to existing literature on infant motor development, we found many similarities. This study expands upon prior research by specifically examining the impact of GMFM within the unique context of the first three months of life.

Introduction:The DENVER II is a measure of developmental problems in young children. It was designed to assess child performance on various age-appropriate tasks and compares a given child's performance to the performance of other children the same age. The instrument consists of 125 tasks, which broadly reflect the following areas: personal-social, fine motor-adaptive, language, and gross motor.

Movement of the body controlled by large muscles are considered gross motor skills. Gross motor milestones are specifically skills that infants are expected to reach by certain age range to be considered typically developing .Gross motor development milestones includes skills like independent head control ,crawling walking jumping .

Need of study : To investigation gross motor developmental activities in infants 0-3 months .For reducing the risk factors of developmental delays .

Method: This prospective, time series, randomized study at Delhi council for child welfare (PALNA) ,Quidsia Bagh , Yamuna marg ,Civil line,New Delhi, Delhi 1100054. It is the sole provider of infant care in the area and served as a Specialized adoption agency .A total of 50 participants were recorded which included 30 females and 20 males. Normal infants development screening from the age 0-3 months by the DENVER 11 Scale in four different aspects Gross motor,Fine motor, Speech & language and social -emotion according to the chronological age & trace motor functioning with sub aspect of 0-3 month Fine motor, Speech & language and social -emotion . And fill the questionnaire with the help care giver. Along with the finding data as per the activity perform by an infant shows during developmental screening to check the gross motor motor

functioning as well as care giver information. This screening requires single time assessment .
Result : t- Test (q1 and2) 0.37307231, (q2,3)0.02086293 , (q3,4)5.6 , (q4,5)0.00371208 ,(q5,6) 0.01138811 , (q6,7) 0.00375606 , (q7,8) 1.453 , (q8,9) 6.644 , (q9,10) 1.1875E-06 , (q10,11) 8.5051E-07 , (q11-12) 0.00271814 .At p= 0.05 ,the highlighted one are significant .
Conclusion: The findings underscore the significance of ongoing surveillance and early intervention in promoting optimal gross motor development during infancy. By prospectively monitoring the developmental progress of these infants, we have laid the foundation for timely interventions that can potentially mitigate challenges associated with improper gross motor development.

INTRODUCTION

The Denver Developmental Screening Test was developed in Denver, Colorado, by Frankenburg and Dodds and published in 1967.[13] As the first tool used for developmental screening in normal situations like pediatric well-child care, the test became widely known and was used in 54 countries and standardized in 15.[14]
Use of the Denver Developmental Screening Test has raised various concerns: the applicability of 1967 norms in the 1990s and onwards,the difficulty of administering and scoring several of the test's language items, and the limited validity in cultures that differ from the normative sample in Denver (ethnic groups, varying levels of maternal education, groups with differing genders), potentially leading to under- or over-referrals for mental health services.
The standardization sample of 2,096 children was selected to represent the children of the state of Colorado. The test has been criticized because that population is slightly different from that of the U.S. as a whole. However, the authors found no clinically significant differences when results were weighted to reflect the distribution of demographic factors in the whole U.S. population. Globally, other countries have standardized the Denver II to fit their respective populations.[9] Significant differences were defined as differences of more than 10% in the age at which 90% of children could perform any given item.[10] Separate norms were provided for the 16 items whose scores varied by race, maternal education, or rural-urban residence.

The DENVER II is a measure of developmental problems in young children. It was designed to assess child performance on various age-appropriate tasks and compares a given child's performance to the performance of other children the same age. The instrument consists of 125 tasks, which broadly reflect the following areas: personal-social, fine motor-adaptive, language, and gross motor.
Not every delay is visible to the eye. Developmental delays and disabilities, such as autism, emotional disturbances, and speech and language disorders, often go undetected until a child enters elementary school.
Study after study has shown that the earlier a delay is recognized and intervention is begun, the better the child's chance of substantial improvement. Developmental screening is one of the best things you can do to ensure a child's success in school and life. (And that's why so many organizations have made it a top priority).
The early years of a child's life are very important for their health and development. Healthy development means that children of all abilities, including those with special health care needs, are able to grow up where their social, emotional and educational needs are met. Having a safe and loving home and spending time with family—playing, singing, reading, and talking—are very important. Proper nutrition, exercise, and sleep also can make a big difference.
Developmental screening takes a closer look at how your child is developing. A missed milestone could be a sign of a problem, so when you take your child to a well visit, the doctor, nurse, or another specialist might give your child a brief test, or you will complete a questionnaire about your child.If the screening tool identifies an area of concern, a formal developmental evaluation may be needed, where a trained specialist takes an in-depth look at a child's development.
If a child has a developmental delay, it is important to get help as soon as possible. When a developmental delay is not found early, children must wait to get the help they need to do well in social and educational settings.
A brief test using a screening tool does not provide a diagnosis, but it indicates if a child is on the right development track or if a specialist should take a closer look. If the screening tool identifies an area of

concern, a formal *developmental evaluation* may be needed. This formal evaluation is a more in-depth look at a child's development, usually done by a trained specialist, such as a developmental pediatrician, child psychologist, speech-language pathologist, occupational therapist, physical therapist, or other specialist. The specialist may observe the child, give the child a structured test, ask the parents or caregivers questions, or ask them to fill out questionnaires. The results of this formal evaluation determines whether a child needs special treatments or early intervention services or both.

The way a child's development progresses in the first years of life can dictate the individual's lifelong development and level of success they could potentially achieve in adulthood. The role of the primary care physician is crucial in the recognition of normal development and identification of developmental delays. The provider should outline appropriate anticipatory guidance to the caregiver and educate them on what they should expect their child to be achieving as they grow. Developing a strong relationship with parents is important to ensure that when any abnormality in the child's development is identified, the parents will acknowledge the perturbation and acquiesce to recommended intervention strategies and treatment plans.

Developmental delays, such as speech and language delay, can be a presenting feature of conditions such as autism spectrum disorder (ASD), and also serve as a prognostic factor.[10] Therefore the recommendation of the American Academy of Pediatrics is to screen at 9, 18, and 30 months; and the screening for ASD at 18 and 24 months.[1] A child with motor delay should have a thorough physical examination, including a complete neurological exam; laboratory testing should include creatine kinase and thyroid function, and brain imaging should be considered.

Whenever screening results are concerning for developmental delay, a further, complete evaluation is necessary. Evaluations ideally performed by developmental specialists (neurodevelopmental pediatricians, developmental-behavioral pediatricians, pediatric neurologists, pediatric psychiatrists), and they can occur at home or medical centers. Early childhood professionals such as educators, psychologists, social workers, and therapists must be included as part of the multidisciplinary team, which will ensure the child is receiving appropriate care.

Referral to early intervention programs as early as possible is valuable to ensure more positive outcomes. These programs not only provide complete evaluations but connect families with the services required, provide them with service coordinators and social workers that can assist families with issues such as transportations, home visits, counseling, insurance. It is essential to recognize that a specific diagnosis is not required to refer to Early Intervention and to educate parents that they can also request the referral

The author of the test, William K. Frankenburg, likened it to a growth chart of height and weight and encouraged users to consider factors other than test results in working with an individual child. Such factors could include the parents' education and opinions, the child's health, family history, and available services. Frankenburg did not recommend criteria for referral; rather, he recommended that screening programs and communities review their results and decide whether they are satisfied.[11]

In 2020 the AAP Council on Children with Disabilities; Section on Developmental Behavioral Pediatrics published a list of screening tests for clinicians to consider when selecting a test to use in their practice. This list did not include Denver II among its choices.[12] However, as stated earlier, the AAP does not approve or endorse any specific tool for screening purposes.[1] Rather they advise on how to approach a child with a concerning screening result and provide further work up via medical evaluations to identify the developmental disorders and/or related medical problems.[12] The chairman of the committee wrote: "In the practice of developmental screening and surveillance, we recommend the incorporation of parent-completed questionnaires or directly administered screening tests into the process of surveillance and screening. However, their results should be combined with attention to parental concerns and the pediatrician's opinion, rather than replacing them, to augment the screening process and increase identification of children with developmental disorders".[13]

METHODOLOGY-

STUDY DESIGN- Through an assessment survey with the help of care taker

SAMPLING TECHNIQUE- Randomized sampling technique

SAMPLE SIZE- 50

STUDY CENTER- Santosh College Of Physiotherapy, PALNA(Delhi Council for Child Welfare

STUDY DURATION- One time study

INTERVENTION DURATION- 3 Months

Inclusion criteria
1. Full term Neonates .
2. DENVER-11 Screening scale
3. Four domains of Denver : gross motor ,fine motor, speech & language,social- emotional

Exclusion Criteria:
1. Neonates born to with very high-risk, Severe Heart Disease,
2. Birth asphyxia
3. Syndromatic infant with congenital anomalies .
4.Blind infants
5.CMV Infants
6. Very low birth weight10 (less than 2000 gms) and IUGR.

PROCEDURE

DATA COLLECTION - Assigned consent form taken from care giver staff and permission was also obtained from the head of the council where the study was conducted .Study included total 50 infants for gross motor function screening in two different group one of 30 female infants and 20 male infants.

Ethics approval to conduct the study is to be obtained from the Delhi Council for Child Welfare. Ethics Committee for child welfare provided their informed consent to voluntarily participate and allowed their infants to be observed for gross motor development before the first data collection cycle.

Throughout the study they "ll not get interrupted . The data were anonymized, in order to not reveal the identities of participants, and the analyses were conducted in such a way that prevented the final results from being linked to individuals.

The eligibility of participants for the study was assessed by an interview, data recording, and direct observation by a licensed pediatric physical therapist.

Demographic data of infants were obtained from child health record books and recorded prior to the first data collection. Caregivers were also interviewed every month, using structured questionnaires about childcare during the data collection period.

Moreover, introduction will be explained to the care givers to record information about illnesses experienced by the infant, such as signs, duration of illness, and treatment. Vaccination data were obtained from the child health record book, in order to ensure that infants had received the required healthcare.

The gross motor development of each infant will assessed one time month in total. Subsequent assessments occurred on the same date of month, plus or minus 1 or 2 days .

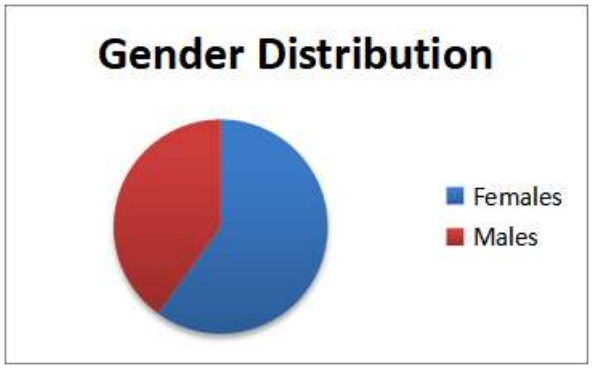
The assessments of motor development were performed through direct observation at NGO in a quiet room familiar to the infant, and with the main caregiver nearby. Each infant wore a diaper during the assessment, such that his or her joints and movements could be clearly observed. Infants moved voluntarily with minimal touching. The main caregivers were asked to change the position of the infants, if needed. Toys could be used to motivate movement, if necessary.

The assessment was performed only when infants will alert or felt well. The assessment of gross motor development will re-scheduled for another time within five days of the due date if infants were not ready for the test.
Only one physiotherapist assessed participants in the current study. The assessor was trained to use the DENVER ll, and performance was determined by an expert with more than 2 years of clinical experience in pediatric physical therapy and who is familiar with the DENVER ll.

The inter-rater reliability between the assessor and expert will tested and analyzed . The intra-rater reliability with one time will be assessed in 50 full-term infants aged 0–3months .(15)

Result

A total of 50 participants were recorded which included 30 females and 20 males.



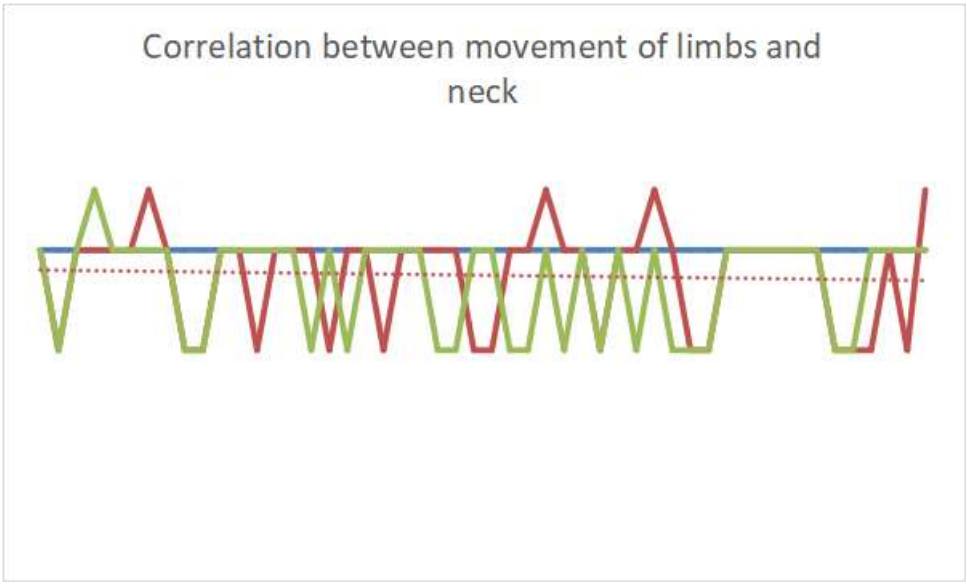
Graph 5.1- Gender Distribution

We used t-test as statistical test to compare the means of two groups and determine if there is a statistically significant difference between them. It is particularly useful when dealing with small sample sizes and assuming that the data follows a normal distribution. There are two main types of t-tests: the independent samples t-test and the paired samples t-test.

Table 5.3- t test analysis for the following

Parameters	t value	p- value
lift his/her neck in prone position	0.03	0.001 (S)
able to move all four limbs	0.02	0.015 (S)
able to follow to midline	5.6	4.11 (NS)
Rigid face	0.03	0.014 (S)
Ability to hold his/her neck 45 degree in prone position	0.01	0.004(S)
respond to bell sound	0.03	0.018 (S)
able to follow to follow to past mid line ?	1.4	0.56 (NS)
smile responsively	0.48	0.04 (S)
able to hold his/her neck 90 degree in prone position	0.02	0.004(S)
vocalize during an interaction	1.14	.098 (NS)
keep his/her hand together	1.19	0.65(NS)
smile spontaneously during an interaction	0.002	0.03(S)

NS- Non Significant; S- Significant



Graph- Correlation between movements

Ethical Considerations

The study will adhere to ethical guidelines, including informed consent procedures, participant confidentiality, and approval from relevant ethics committees.

Discussion:

The aim of this study was to investigate the impact of the Gross Motor Function Measure (GMFM) on infants aged 0-3 months, focusing on its utility as a means of evaluating gross motor function during this critical developmental period. The discussion will delve into key findings, implications for clinical practice, methodological considerations, and avenues for future research. Our study revealed correlation between the joint movements. Comparing our results to existing literature on infant motor development, we found many similarities. This study expands upon prior research by specifically examining the impact of GMFM within the unique context of the first three months of life.

The practical implications of our findings for clinicians working with infants are substantial. This insight may inform early interventions and contribute to optimizing developmental outcomes for this age group.

While our study provides valuable insights, certain methodological limitations must be acknowledged. Our findings align with infants GMFM is a relevant tool for assessing gross motor function in infants during the first three months of life. However, further research may explore potential modifications or extensions to existing theoretical frameworks based on the observed nuances in this age group.

Limitations

Specific limitations of the GMFM-88 are: (1) individuals with identical percent scores could have very different scoring profiles limiting comparability; (2) the time it takes to administer, observe, and score all 88 test items; and (3) reduced responsiveness for children with very low or very high scores.

Conclusion

In conclusion, this prospective study aimed to meticulously assess the gross development of a group of infants with the overarching goal of identifying and addressing early signs of improper gross motor development. Through our comprehensive examination, we have gained valuable insights into the developmental trajectories of these infants, enabling us to proactively intervene in instances where deviations from typical milestones are observed.

The findings underscore the significance of ongoing surveillance and early intervention in promoting optimal gross motor development during infancy. By prospectively monitoring the developmental progress of these infants, we have laid the foundation for timely interventions that can potentially mitigate challenges associated with improper gross motor development.

REFERENCES

1) T. antGoyen et al.Longitudinal motor development of “apparently normal” high-risk infants at 18 months, 3 and 5 years Early Human Development(2002)
2) G.J. Hindmarsh et al.Gender differences in cognitive abilities at 2 years in ELBW infants
3) J.K. Squires et al.Parent-completed developmental questionnaires: Effectiveness with low and middle income parents Early Childhood Research Quarterly(1998)
4) J.P. Piek et al.The relationship between motor coordination, executive functioning and attention in school aged childrenArchives of Clinical Neuropsychology(2004)
5) R. Kail Speed of information processing: Developmental change and links to intelligence Journal of School Psychology(2004)
6) Funk et al., 2003; Lucas and Koslow, 1984; Wallin et al., 1985
7) Malkia E, Ljunggren AE. Exercise programs for subjects with low back disorders. Scand J Med Sci sports. 1996; 6:73– 81.
8) M.C. Allen et al.Screening for cerebral palsy in preterm infants J of Perinatol(1994)Bayley N. Bayley Scales of Infant Development, 2nd ed., San Antonio: Psychological Corporation,…

9) C.J. DunstDiscontinuity and instability in early motor development: Implications for assessmentTopics in Early Childhood Special Education (TECSE)(1981)
10) P.H. DworkinBritish and American recommendations for developmental monitoring: The role of surveillancePediatrics(1989)
11) Folio MR, Fewell RR. Peabody Developmental Motor Scales and Activity Cards: A Manual, DLM Teaching Resources, Allen,…
12) Gesell A. Infancy and Human Growth. New York: MacMillan Company,…
13) Gesell A. Gesell Developmental Schedules, New York: Psychological Corporation,...Gesell A. The Embryology of Behavior, London: MacKeith Press,…
14) Frankenburg, W.K.; Dodds, J.; Archer, P. (1990). *Denver II Technical Manual*. Denver Developmental Materials, Inc. p. 1.
15) ^ Frankenburg, W. K.; Dodds, J.; Archer, P.; Shapiro, H.; Bresnick, B. (January 1992). "The Denver II: a major revision and restandardization of the Denver Developmental Screening Test". *Pediatrics*. **89** (1): 91–97. doi:10.1542/peds.89.1.91. ISSN 0031-4005. PMID 1370185. S2CID 24915740.
16) Allen MC, Alexander GR. Using gross motor milestones to identify very preterm infants at risk for cerebral palsy. Dev Med Child Neurol. 1992 Mar;34(3):226-32. doi: 10.1111/j.1469-8749.1992.tb14995.x. PMID: 1559602.
17) Mendonça, Bianca; Sargent, Barbara; Fetters, Linda (2016-10-04). "Cross-cultural validity of standardized motor development screening and assessment tools: a systematic review". *Developmental Medicine & Child Neurology*. **58** (12): 1213–1222. doi:10.1111/dmcn.13263. ISSN 0012-1622. PMID 27699768
18) Orawan Keeratisiroj:Intra-Individual Variability in Gross Motor Development in Healthy Full-Term Infants Aged 0–13 Months and Associated Factors during Child Rearing
19) Scharf RJ, Scharf GJ, Stroustrup A. Developmental Milestones. Pediatr Rev. 2016 Jan;37(1):25-37; quiz 38, 47. [PubMed]
20) Lipkin PH, Macias MM., COUNCIL ON CHILDREN WITH DISABILITIES, SECTION ON DEVELOPMENTAL AND BEHAVIORAL PEDIATRICS. Promoting Optimal Development: Identifying Infants and Young Children With Developmental Disorders Through Developmental Surveillance and Screening. Pediatrics. 2020 Jan;145(1) [PubMed]
21) Anderson LM, Shinn C, Fullilove MT, Scrimshaw SC, Fielding JE, Normand J, Carande-Kulis VG., Task Force on Community Preventive Services. The effectiveness of early childhood development programs. A systematic review. Am J Prev Med. 2003 Apr;24(3 Suppl):32-46. [PubMed]
22) Lejarraga H, Kelmansky DM, Passcucci MC, Masautis A, Insua I, Lejarraga C, Nunes F. Assessment of child psychomotor development in population groups as a positive health indicator. Arch Argent Pediatr. 2016 Feb;114(1):23-9. [PubMed]
23) Preston JL, Frost SJ, Mencl WE, Fulbright RK, Landi N, Grigorenko E, Jacobsen L, Pugh KR. Early and late talkers: school-age language, literacy and neurolinguistic differences. Brain. 2010 Aug;133(Pt 8):2185-95. [PMC free article] [PubMed]
24) Garg A, Dworkin PH. Applying surveillance and screening to family psychosocial issues: implications for the medical home. J Dev Behav Pediatr. 2011 Jun;32(5):418-26. [PubMed]
25) Lipkin PH, Okamoto J., Council on Children with Disabilities. Council on School Health. The Individuals With Disabilities Education Act (IDEA) for Children With Special Educational Needs. Pediatrics. 2015 Dec;136(6):e1650-62. [PubMed]
26) Weitzman C, Wegner L., Section on Developmental and Behavioral Pediatrics. Committee on Psychosocial Aspects of Child and Family Health. Council on Early Childhood. Society for Developmental and Behavioral Pediatrics. American Academy of Pediatrics. Promoting optimal development: screening for behavioral and emotional problems. Pediatrics. 2015 Feb;135(2):384-95. [PubMed]
27) Guevara JP, Gerdes M, Localio R, Huang YV, Pinto-Martin J, Minkovitz CS, Hsu D, Kyriakou L, Baglivo S, Kavanagh J, Pati S. Effectiveness of developmental screening in an urban setting. Pediatrics. 2013 Jan;131(1):30-7. [PubMed]
28) Kover ST, Edmunds SR, Ellis Weismer S. Brief Report: Ages of Language Milestones as Predictors of Developmental Trajectories in Young Children with Autism Spectrum Disorder. J Autism Dev Disord. 2016 Jul;46(7):2501-7. [PMC free article] [PubMed]
29) Lipkin, P.H.; Gwynn, H. (2007). "Improving developmental screening: Combining parent and pediatrician opinions with standardized questionnaires". *Pediatrics*. **119** (3): 655–56. doi:10.1542/peds.2006-3529. PMID 17332228. S2CID 33274155.

30) ^ Jump up to:[a] [b] Glascoe, F.P.; Byrne, K.E.; Ashford, L.G. (1992). "Accuracy of the Denver II in developmental screening". *Pediatrics*. **89** (6 Pt 2):12211225. doi:10.1542/ peds.89.6. 1221. PMID 1375732. S2CID 7345061.
31) ^ Jump up to:[a] [b] Wijedasa, D. (November 2012). "Developmental screening in context: adaptation and standardization of the Denver Developmental Screening Test-II (DDST-II) for Sri Lankan children: Developmental screening in context". *Child: Care, Health and Development*. **38** (6): 889–899. doi:10.1111/j.1365-2214.2011.01332.x. hdl:1983/e052a32c-f5fe-4612-9f78-f8d4081aeb22. PMID 22017516.
32) ^ "Standardization and adaptation of the Denver Developmental Screening Test (DDST) for use in Tbilisi children". *ResearchGate*. Retrieved 2021-09-13.
33) ^ Santos, Rosana S.; Araújo, Alexandra P. Q. C.; Porto, Maria Amelia S. (2008-08-06). "Early diagnosis of abnormal development of preterm newborns: assessment instruments". *Jornal de Pediatria*. **84** (4): 289–299. doi:10.2223/JPED.1815. ISSN 0021-7557. PMID 18688553.
34) ^ El-Behadli, Ana F.; Neger, Emily N.; Perrin, Ellen C.; Sheldrick, R. Christopher (July–August 2015). "Translations of Developmental Screening Instruments: An Evidence Map of Available Research". *Journal of Developmental & Behavioral Pediatrics*. **36** (6): 471–483. doi:10.1097/DBP.0000000000000193. ISSN 0196-206X. PMID 26154718. S2CID 5368957.
35) 2005-2006 National Family Health Survey (NFHS 3) National Fact Sheet. Ministry of Health and Family Welfare Government of India.
36) 2. 2015-16. National Family Health Survey (NFHS-4) Prevalence of anaemia among women.
37) 3. Lozoff B, Beard J, Connor J, Barbara F, Georgieff M, Schallert T. Long-lasting neural and behavioral effects of iron deficiency in infancy. Nutr. Rev. 2006;64(5 Pt 2):S34-43.
38) 4. Thomas DG, Grant SL, Aubuchon-Endsley NL. The Role of Iron in Neurocognitive Development. Developmental Neuropsychology 2009;34(2):196 - 222.
39) Lozoff B, Brittenham GM, Wolf AW, McClish DK, Kuhnert PM, Jimenez E, et al., Iron Deficiency Anaemia and Iron Therapy Effects on Infant Developmental Test Performance. Pediatrics 1987;79(6):981-95.
40) Berglund SK, Westrup B, Hägglöf B, Hernell O, Domellöf M. Effects of Iron Supplementation of LBW Infants on Cognition and Behaviour at 3 Years. Pediatrics 2013;131(1):47-55.
41) Basvanthappa B.T.,(2001), "Nursing Research",1st edition,New Delhi, Jayee Publishers.
42) 8. McCann JC, Ames BN. An overview of evidence for a causal relation between iron deficiency during development and deficits in cognitive or behavioral function. The American Journal of Clinical Nutrition 2007;85(4):931-45.
43) Grantham-Mc Gregor S, Ani C. A Review of Studies on the Effect of Iron Deficiency on Cognitive Development in Children. The Journal of Nutrition 2001;131(2):649S-68S
44) Szajewska H, Ruszczynski M, Chmielewska A. Effects of iron supplementation in nonanemic pregnant women, infants, and young children on the mental performance and psychomotor development of children: a systematic review of randomized controlled trials. Am. J. Clin. Nutr. 2010;91(6):1684-90.
45) Weeks, A. (1997). Umbilical cord clamping after birth: Better not to rush. BMJ 335, 312-3 12. McDonald SJ, Middleton P. Effect of timing of umbilical cordclamping of term infants on maternal and neonatal outcomes. Cochrane Database Syst Rev. 2008;CD004074.
46) 13. Andersson O, Hellstrom- Westas L, Andersson D, Domell of M. Effect of delayed versus early umbilical cord clamping on neonatal outcomes and iron status at 4 months: a randomized controlled trial. BMJ. 2011;343:d7157.
47) Frankenburg, W.K.; Dodds, J.; Archer, P. (1990). Denver II Technical Manual. DenverII.com: Denver Developmental Materials, Inc. p. 1.
48) Ramcharan R, Ali Z, Adams J, Simeon D. Standardization of the Denver Development Screening Test II (DDST II) for Trinidadian children. Available at: GRANT REPORTS 2005/J