**Appendix**

**WHO Windows of achievement**

1. Conducted to review the methods for generating windows of achievement for six gross motor development
2. To compare the actual windows with commonly used motor development scales
3. Data was collected longitudinally to describe the 6 gross MM attainment with children aged 4-24 mo. in Ghana, India, Norway, Oman and USA.
4. Trained fieldworkers assessed 816 children by scheduled visits (monthly for 1st yr. bimonthly for 2nd yr.)
5. Caregivers also recorded ages of achievement
6. Constructed windows of achievement for each MM and bound by the 1st and 99th percentile.

**Table 15 MGRS (Multicenter Growth Reference Study) Performance Criteria**

**for Six Gross Motor Milestones**

|  |  |
| --- | --- |
| **Gross Motor Milestone** | **MGRS Performance Criteria** |
| **Sitting without support** | Child sits up straight with the head erect for at least 10 seconds. Child does not use arms or hands to balance body or support position |
| **Hands-and-knees crawling** | Child alternately moves forward or backward on hands and knees. The stomach does not touch the supporting surface. There are continuous and consecutive movements, at least three in a row. |
| **Standing with assistance** | Child stands in upright position on both feet, holding onto a stable object (e.g., furniture) with both hands without learning on it. The body does not touch the stable object, and the legs support most of the body weight. Child thus stands with assistance for at least 10 seconds |
| **Walking with assistance** | Child is in upright position with the back straight. Child makes sideways or forward steps by holding onto a stable object (e.g., furniture) with one or both hands. One leg moves forward while the other support part of the body weight. Child takes at least five steps in this manner |
| **Standing alone** | Child stands in upright position on both feet (not on the toes) with the back straight. The legs support 100% of the child’s weight. There is no contact with a person or object. Child stands alone for at least 10 seconds. |
| **Walking alone** | Child takes at least five steps independently in upright position with the back straight. One leg moves forward while the other supports most of the body weight. There is no contact with a person or object |

**Reference**: Winhoven et al., 2004 Assessment of gross motor development in the WHO Multicenter Growth

Reference study, Food and Nutrition Bulletin Vol. 25 no.1

[http://www.who.int/childgrowth/mgrs/en/fnb\_motor\_37\_45.pdf?ua=1](https://owa.emory.edu/owa/redir.aspx?C=dk5sJXBE50S3DRgIQLdXv2MFEIvcf9EIktvt_jXk-X9TWHQLsMl-Kr8IviSlWPToN2nSbSH7k48.&URL=http%3a%2f%2fwww.who.int%2fchildgrowth%2fmgrs%2fen%2ffnb_motor_37_45.pdf%3fua%3d1) (S38)

 **Figure 3 Pictures for six gross motor milestones in MGRS**



 Reference: Winhoven et al., 2004 Assessment of gross motor development in the WHO Multicenter

 Growth Reference study, Food and Nutrition Bulletin Vol. 25 no.1

 [http://www.who.int/childgrowth/mgrs/en/fnb\_motor\_37\_45.pdf?ua=1](https://owa.emory.edu/owa/redir.aspx?C=dk5sJXBE50S3DRgIQLdXv2MFEIvcf9EIktvt_jXk-X9TWHQLsMl-Kr8IviSlWPToN2nSbSH7k48.&URL=http%3a%2f%2fwww.who.int%2fchildgrowth%2fmgrs%2fen%2ffnb_motor_37_45.pdf%3fua%3d1) (S39-40)

 **Figure 4 Windows of milestone achievement expressed in months**.



 Reference: WHO Multicenter Growth Reference Study Group. WHO Motor Development Study: Windows

 of achievement for six gross motor development milestones. Acta Pediatric Supplement 2006; 450: 86-95

 [http://www.who.int/childgrowth/standards/mm\_windows\_graph.pdf?ua=1](https://owa.emory.edu/owa/redir.aspx?C=dk5sJXBE50S3DRgIQLdXv2MFEIvcf9EIktvt_jXk-X9TWHQLsMl-Kr8IviSlWPToN2nSbSH7k48.&URL=http%3a%2f%2fwww.who.int%2fchildgrowth%2fstandards%2fmm_windows_graph.pdf%3fua%3d1)

The six windows have age overlaps but, range is difference depends on gross MM. The narrowest range is sitting w/o support (5.4 mo.) and widest are walking alone (9.4mo) and standing alone (10 mo.). WHO windows of achievement estimated 1st and 99th percentiles in months such as: Sitting w/o support (3.8, 9.2mo), Standing with aid (4.8, 11.4mo), Hands-and-knees crawling (5.2, 13.5mo), Walking with aid (5.9, 13.7mo) , Standing alone (6.9, 16.9mo) and Walking alone (8.2, 17.6mo).The windows represent normal variation in ages of milestone achievement among healthy children (WHO 2006).

 **Table 16 Summary of the Studies: Eleven Factors that Associated with Infants’ Gross Motor Milestone Development**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Factors associate MM** | **Researcher (Year)** | **Country of study** | **Sample size** | **Study design** | **Motor milestone achievement & measurement tool** | **Positive association** | **Negative association**  | **No association** |
| **Children’s nutritional factor** | Surkan et al., (2013) | Nepal | 554 | Randomized placebo control and longitudinal study | Mean age in motor milestone score from visit 1 to visit 5 |  |  |  |
| Yalcin et al., (2012) | Turkey | 1,553 | Cross sectional study | Walking alone (mean age of month achievement) |  |  |  |
| Angulo-Barroso et al.,(2010) | Detroit,USABeijing, ChinaAccura,Ghana | 209 | Observational study | 19 gross motor milestone from sit to run (Sum of pass score) |  |  |  |
| Katz et al., (2010) | Nepal | 3,264 | Randomized control trial | Sitting, walking, running, jumping, standing on one leg (% and mean of age) |  |  |  |
| Shafir et al (2008) | USA | 106 | Observational study | Standing and walking (Peabody Developmental Motor)  |  |  |  |
| Afarwuah et al., (2007) | Ghana | 313 | Intervention case control | Walking alone (percentage of achievement) |  |  |  |
| Olney et al., (2007) | Tanzania | 771 | Cross sectional baseline analysis of the Child Development Sub study (CDS)Partly Randomized double blind trial (by observation) | From sit to walk (including creep, crawl, stand and walk (% motor milestone Achieved) |  |  |  |
| Kariger et al., (2005) | Tanzania | 646 | Observational study | Pull to sit-stand alone n one feet (percentage of attainment) |  |  |  |
| Siegel et al., (2005) | Nepal | 485 | Cross sectional, community-based study | 14 MM17 item scaleswalk1: walk with supportwalk 2 (can walk w/o aid): run, jump or stand on 1 footNo walker: able to stand with or w/o aid (stand1, stand2)(Proportion of walking) |  |  |  |
| Kuklina et al., (2004) | Guatemala | 218 | Longitudinal  | Walking alone, (% of gross motor achievement) |  |  |  |
| Jahari et al., (2000) |  | 12 months(n=53), 18 months (n=83) | Randomized with 3 treatment (energy and iron supplement) by two cohort studies | From sit to run (Bayley scale) |  |  |  |
| Harahap et al., (2000)49 | Java, Indonesia | 18 | Randomly assigned to two different nutritional supplements( iron or energy) for 6 months | Mental and motor development was evaluated with the Bayley Scale). |  |  |  |
| Bentley et al., (1997) | Guatemala | 85 | Double blind clinical trial | Stand, crawl and walk (percentage of attainment) |  |  |  |
| **Children’s physical growth** | Yalcin et al., (2012) | Turkey | 1,553 | Cross sectional study | Walking alone (age of month) |  |  |  |
| Afarwuah et al., (2007) | Ghana | 313 | Intervention case control | Walking alone (percentage of achievement) |  |  |  |
| Olney et al, (2007) | Tanzania | 771 | Cross sectional baseline analysis of the Child Development Sub study (CDS)Partly Randomized double blind trial (by observation) | From sit to walk (including creep, crawl, stand and walk (% of gross motor milestone Achieved) |  |  |  |
| Kariger et al.,(2005) | Tanzania | 646 | Observational study | Pull to sit-stand alone n one feet (percentage of attainment) |  |  |  |
| Siegel et al., (2005) | Nepal | 485 | Cross sectional, community-based study | Sit to run (Mean age of month walking)  |  |  |  |
| Kuklina et al., (2004)72 | Guatemala | 263 | Longitudinal study (at 9 and 12 months) | 17-milestone Gross Motor Development Scale: (median and mean of age of walking) |  |  |  |
| Mulligan et al., (1998) 83 | USA | 48 (girls=25, boys=23) | Longitudinal Observational study (at 6, 9 and 12 months of age) | Motor development was measured at 6, 9 and 12 months of age byMotor Bayley Scale of Infant Development |  |  |  |
| **Children’s ethnic background** | Naqvi et al., (2012) | Tanzania | 103(49 from urban, 54 from rural) | Cross sectional study (12-83months) | Battele developmental Inventory Screening Test |  |  |  |
| Angulo-Barroso et al., (2010) | China, Ghana, and USA | 209 | Observational study | 19 gross motor milestone from sit to run (Sum of pass score) |  |  |  |
| Kelly et al., (2006)68 | UK | 15 ,994( males: 8,212, females: 7,782) | Millennium Cohort Study with difference races (Indian, Black Caribbean, and Black African Children, Pakistan and Bangladeshi) | Overall gross motor milestones (% of attainment) |  |  |  |
| Siegel et al.,(2005)  | Nepal | 485 | Cross sectional, community-based study | Sit to run (Mean age of month walking)  |  |  |  |
| Nelson et al., (2004) | Hong Kong | 72 | Cross sectional study | Age of rolling over (mean age of roll over) depends on supine and prone |  |  |  |
| Nixon-Cave et al., (2001) | USA | 9 infants and their families, 5 males and 4 females from different ethnic background | Case control study (questionnaire) | sitting, crawling and walking for infants 12-18 months of age(the Peabody Developmental Motor Scales :PDMS)  |  |  |  |
| Stanitski et al.,(2000) | USA | 986 children (575 male, 471 female | Cohort study | Walking (Mean age month of walking attainment) |  |  |  |
| Allen et al., (1990) | Ghana | 313  | Randomized case control study | Walk independent (% of achievement) |  |  |  |
| Hopkins et al., (1989) 55 | UK | 124 | Observational study | Sitting, crawling and walking alone ( mean of age achieved) |  |  |  |
| Capute et al., (1985) | USA | 381 | Longitudinal study at 2, 4, 6, 12, 15, 18 and 24 months | Gross motor milestones ( e.g., roll prone to supine, roll supine to prone, sit with or without aid, creep get to sit, crawl, pull to stand, cruise, walk, walk backward and run) by the Bayley mental and motor scale and mean age and percentage of attainment) |  |  |  |
| Stewart et al., (1981) | USA | 250 | Cohort study | Gross motor milestones : (1-24 items: from prone to pedale trike) by Revised Denver Developmental Screening Test (RDDST; % of passing) |  |  |  |
| Grantham-McGregor et al., (1971) | Jamaica | 300 | Longitudinal study | Gross motor milestone: lift head to walk alone (% of achievement) |  |  |  |
| Phatak (1969) | India  | n=278, males 168, female 110) from 1 to 30 months | Longitudinal study | Motor development (67 points) by the Bayley Infant Scales |  |  |  |
| **Children’s birth weight** | Yalçın et al.,(2012) | Turkey | 1,553 | Cross sectional study | Walking alone (mean age of month) |  |  |  |
| Luo et al., (2009) | Taiwan | 29 preterm infants and 20 full term | A cohort study with a longitudinal follow-up design | The age of walking attainment was measured by Alberta Infant Motor Scale (AIMS) |  |  |  |
| Pin et al., (2009) | Australia | 62 preterm and 53 term | Longitudinal study | Rolling, sitting and standing by the Alberta Infant Motor Scale (AIMS). |  |  |  |
| Jeng et al., (2008) | Taiwan  | 29 preterm and 29 term | Cross sectional study | Age of onset of walking in two groups at 18 month of corrected age was measured by Peabody Developmental Motor Scale (PDMS-II) and % of achievement |  |  |  |
| Little et al., 2005 | USA | preterm children (n=48) ages range from 2 to 35months and full term children (n=920) | Retrospective cohort study | Motor development by the mean of Merrill-Palmer-Revised score |  |  |  |
| Jeng et al., 2004 | Taiwan | (22 full term, 22 preterm infants) | Longitudinal study (Observation) | Walking alone (The distribution of age walking attainment) |  |  |  |
| Pridham et al., 2002 | USA | full term (n=52) and preterm (n=47) | Longitudinal,descriptive study | Gross motor development Bayley Psychomotor Scale of Infant Development (BSID-I) |  |  |  |
| Jeng et al., 2000 | Taiwan | VLBW preterm infants (n=96) and normal term (n=82) | Cohort Longitudinal study | Age of walking attainment by Alberta Infant Motor Scale (AIMS) |  |  |  |
| Iwata et al., 199157 | Japan | 395 | Cross sectional study | The age of begin to walk (Distribution of age in months start walking) |  |  |  |
| Allen et al., 1990 | Ghana | 313  | Randomized case control study | Walk independent (% of achievement) |  |  |  |
| Palisano et al.,1985 | USA | premature infant(n=23) and fullterm infants (n=20) | Cross sectional study | Standing, creeping, cruising and walking alone byPeabody Developmental Motor Scale (PDMS) |  |  |  |
| Grantham McGregoret al., 1971 | Jamaica | 300 | Longitudinal study | Gross motor milestone: lift head to walk alone (% of achievement) |  |  |  |
| **Maternal Nutritional status** | Yalcın et al., 2012 | Turkey | 1,553 | Cross sectional study | Age of walking ( mean age of month) |  |  |  |
| Tofail et al.,2008 | Bangladesh | 2,853 | A large, randomized, controlled trial of pregnancy supplementation | Motor Index of the Bayley Scales of Infant Development |  |  |  |
| Oken et al., 2008 | Denmark | 25,446 | Longitudinal observation study | Sum of passed items ( hold up with head, sit with a straight back, roll back to front, sit alone, walk alone) at 6 and 18 mo |  |  |  |
| Kirksey et al., 1994 | Egypt | 50 | Longitudinal observation study | BSID-I  |  |  |  |
| **Maternal exposed to environmental factors** | Kaňková et al, 201263 | Czech Republic | 351 | Retrospective cohort study | Gross motor milestones (e.g. lift to head, turn over from supine to prone positions, sit, crawl and walk alone) by mean age of attainment |  |  |  |
| Laslo-Barker et al, 2012 | Canada | 48 | Cohort study | Sit, crawl, stand and walk by the Bayley Scales of Infant Development |  |  |  |
| Singer et al., 2012 | UK | MDMA exposed (n=28) and non-MDMA exposed infants (n=68) | Cohort study | Overall gross motor milestone birth to 4months by the Bayley Mental and Motor Development Scales (MDI, PDI), and the Alberta Infant Motor Scales (AIMS) |  |  |  |
| Smith et al., 2011 | USA | MA exposed group (n=179) and non-exposed group (n=177). | Longitudinal study and partly cross sectional study | The motor and cognitive development was measured with BSID-II (The Bayley Scales of Infant Development II) or PDMS(Peabody Developmental Motor Scales)-2 |  |  |  |
| Divan et al., 2011 | Denmark | 100,000 | Danish National cohort study and Longitudinal study | Gross motor milestones: hold up head, sit with back straight, roll from back to front, sit up right on the floor, grab objects out of reach and crawl on stomach) by 0-5 scale points (sum of pass or fail)  |  |  |  |
| Tofail et al., 2009 | Bangladesh | 1,799 | A large population-based study | Motor development of those infants at age of 7 months by Bayley Scale of Infant Development-II (BSID-II) Psychomotor Development Index (PDI) and the Mental Development Index (MDI). |  |  |  |
| Punamaki et al., 2006 | Finland | 520 | Longitudinal study | Sitting to walking with or without support by the mean score of achievement (pass or fail score) |  |  |  |
| Nakajima et al., 2006 | Japan | 134  | Cohort study | Motor and metal score was measured by using mean score of Bayley Scales Development (BSID-II; MDI and PDI). Mental developmental Index (MDI) and Psychomotor developmental Index (PDI) scores were measured based on the calibration scale from raw score and index scores. |  |  |  |
| Huizink et al., 2002 | Netherland | 43 | Prospective Longitudinal study and Observation | 3 and 8 months by means of the Bayley Scales of Infant Development (BSID). |  |  |  |
| Meyer-Bahlburg et al., 2004 | USA | 174 prenatally DEX-exposed children (including 48 with CAH) and 313 unexposed children (including 195 with CAH) | Cohort study | Kent Infant Development Scale (KIDS): 252 item questionnaires designed for the age group 0-15months and age-based normalized standard score for five developmental subscales and a composite. Revised Prescreening Developmental Questionnaire (RPDQ or Revised Denver): four age specific form with 105 items that cover the age group 0 months to 6 year. Age-Based delay score (classified no delay, one delay, more than two delays). The child Development Inventory (CDI) 270 Yes or no items for age group 15month -6yr (sum up the eight domain scales and overall scale and general development) from the age 0-4year. |  |  |  |
| Harolyn et al., 1999 | USA | 157 newborn infants (follow up at 3 months (n=118), 6months (n=124) and 12 months (n=77) | Randomized home-based nursing-intervention trial | Gross motor milestone attainment at a certain age. Percentage of age (months) at achievement |  |  |  |
| Fetter et al., 1998 | USA, Israel | exposed (n=28) and unexposed (n=22) | A longitudinal study | The motor milestone was measured by the Alberta Infant Motor Scale (AIMS), the Movement Assessment of Infants (MAI) and the Peabody Development Motor Score (PDMS). |  |  |  |
| Crowther et al.,1997 29 | Australia | Hormone infants (531), control infants (511). | Double-blinded randomized controlled trial | 7 gross motor milestones (sit to walk) were measured by mean of the gross motor milestones |  |  |  |
| Richardson et al., 1995 | USA | 829 | A longitudinal study | Mental and motor development was by Bayley Scales Development (BSID). |  |  |  |
| Reid et al., 1991 | USA | 90 | A longitudinal study | The Bayley Scales of Infants Development and Infant Mullen Scale |  |  |  |
| **Children’s exposed to environmental factors** | Osnat et al., 20138 | USA  | 27 infants (17 males, 10 females) | Longitudinal observation study | Four motor milestones (e.g., sitting, pulling to stand, crawling and cruising) and infant’s overall motor development were measured by using the Alberta Infant Motor Scale (AIMS). |  |  |  |
| Yalçın et al., 2012 | Turkey | 1,553 | Cross sectional study | Age of walking ( mean age of month) |  |  |  |
| Miquelote et al., 2012 | Brazil | 32 | Longitudinal study | Gross Motor Skill (72 items)by the Bayley Scales of Infant and Toddler Development, Third Edition (Bayley-III) |  |  |  |
| Doralp et al., 2010 | Canada | 189(102boys, 87girls) | Cross sectional study | Early motor development ( prone, supine, sitting and standing) was measured using the Alberta Infant Motor Scale (AIMS) |  |  |  |
| Karasilk et al., 2008 | USA | 28 | Cross sectional and observation | Crawling and walking by mean of month age achievement |  |  |  |
| Pridham et al., 2002 | USA | Full term (n=52) and preterm (n=47) infants. | Cross sectional study | Motor development scale at 12 month by Bayley Psychomotor Scale of Infant Development (BSID-I) |  |  |  |
| Garrett et al., 2002 | Northern Ireland | 190 (83 boys and 107girls) | Cross sectional study | Sitting , rolling over, crawling , standing and walking alone by mean age of month achievement |  |  |  |
| Siegel et al., 1999 | USA | 109 | Retrospective cohort and longitudinal study at 6,9 and 12 months | Crawl and walk aloneBayley Mental Development Index and PDI (Psychomotor Development Index) |  |  |  |
| Mulligan et al., 1998 | USA | 48 | Longitudinal observational study | Motor development was measured at 6, 9 and 12 months of agethe Bayley Scale of Infant Development score |  |  |  |
| Iwata et al., 1991 | Japan | 395 | Cross sectional study | Age of first month walking alone (% of achievement) |  |  |  |
| Porter et al., 1972 | Philippines | 94 | Longitudinal case control study | Motor development quotient score in pretest, midtest and posttest. The mean of motor development quotient |  |  |  |
| **Children’s****sleeping and playing position** | Lewycky et al., 2009 | Canada | 102( female =47, males=53) | Longitudinal observation study | Age of first rolling (e.g., supine to prone, prone to supine) by mean age of achievement |  |  |  |
| Ohman et al., 2009 | Sweden | Eighty-two infants with CMT (35 females and 47 males) were compared with 40 healthy infants (18 females and 22 males) | Longitudinal study | Motor development was assessed with the Alberta Infant Motor scale (AIMS) |  |  |  |
| Davis et al., 2008 | USA | 276 | Prospective, practice base study (longitudinal) | Rolling prone to supine, tripod sitting, creeping, crawling, and pulling to stand by the mean age of month achievement |  |  |  |
| Fetters et al., 2007  | USA, Isarel | 68 (30 preterm infants born very-low birth weight (VLBW) and white matter disease (PTWMD); 21 preterm infants born VLBW without WMD (PT); and 17 term infants (Term). | Longitudinal study at 1, 5, 9 months | Gross motor performance was measured by the AIMS (Alberta Infant Motor Scale) with a pass or fail score of 58 items |  |  |  |
| Salls, et al., 2002 | USA | 66 infants at 2.0 (n = 23), 4.1 (n = 26), and 6.0 (n = 17) months | Pilot study, Longitudinal study | Head up 45 degree, head up 90 degree, sit head steadyby the Denver II Gross Motor Sector (pass and fail distribution scores |  |  |  |
| Jantz et al., 1997 | USA | 343 | Longitudinal study | Rolling over, pulling to sit without head lag (at 4 months), and sitting upright at 6 months. The gross motor milestones were measured by the Denver Developmental Screening Revised Test (% of pass or fail score). |  |  |  |
| Iwata et al., 1991 | Japan | 395 | Cross sectional study | Age of first month walking alone (% of achievement) |  |  |  |
| **Other motor milestone’s achievement** | Kimura-Ohba et al., 2011  | Japan | 290 | Longitudinal study | Rolling over, crawling and sitting bymean age of walking related to % of those three gross motor milestone attainments was measured |  |  |  |
| Jaffe et al., 1996 | Israel | 360 | Prospective cohort and longitudinal study | Mean age of sitting and walking alone was measured by the Denver Developmental Screening Test (DDST) and assessed the mean age of achievement. |  |  |  |
| Bottos, et al., 1989 | Italy | index group(n=270) control group(n=154)  | Longitudinal case control study | The mean age of walking,Crawler on hands and knees: early crawlers, late crawlers, stomach creepers and shufflers by proportion of achievement |  |  |  |
| Touwen et al., 1971 | Netherland | 50( 27 boys and 23 girls) | A longitudinal study | Creeping, crawling and sitting) and walking without support. The gross motor milestone was measured by mean age of achievement. |  |  |  |
| **Children’s health status** | Garcia et al., 2011 | USA | 52 | Longitudinal study | Rolling front to back, rollingback to front, sitting alone for 10 seconds, crawling, pullingto stand, and walking alone was measured by the Alberta Infant Motor Scale (AIMS) and the mean age of month |  |  |  |
| Olney et al, 2007 | Tanzania | 771 | Cross sectional baseline analysis of the Child Development Sub study (CDS)Partly Randomized double blind trial (by observation) | From sit to walk (including creep, crawl, stand and walk (% of the highest motor milestone Achieved) |  |  |  |
| Haley et al., 1986 | USA | 40 full term (>37weeks) non-handicapped infants aged 2-10months (males 33, females 17). Ten infants comprised each 2 months by age group. (2-4, 4-6, 6-8, 8-10 months). 20 infants with Down Syndrome aged 2-24months (males 7, females 13) | Longitudinal study | Two gross motor milestones achievement (e.g., sitting and prone position). The gross motor milestone was measured by the Bayley Scale of Infant Development (BSID) |  |  |  |
| Tenbrinck et al 1974 | USA | 200 | Retrospective Cohort study | The gross motor milestones (e.g., sit, stand alone, and walk measured by the mean of age month achieved and distribution. |  |  |  |
| **Other factors** | Restiffe et al.,2012 | Brazil | preterm infants (PT; n=101) without cerebral palsy to healthy full-term (FT; n=52 | Prospective longitudinal study | Age of walking alone by the Alberta Infant Motor Scale (AIMS)and the mean age of achievement |  |  |  |
| Yalcin et al., 2012 | Turkey | 1,553 | Cross sectional study | Age of walking ( mean age of month) |  |  |  |
| Kimura-Ohba et al., 2011  | Japan | 290 | Longitudinal study | Rolling over, crawling and sitting by the mean age of walking related to % of those three gross motor milestone attainments was measured |  |  |  |
| Ohman et al., 2009 | Sweden | Eighty-two infants with CMT (35 females and 47 males) were compared with 40 healthy infants (18 females and 22 males) | Longitudinal study | Motor development was assessed with the Alberta Infant Motor scale (AIMS) |  |  |  |
| Kirkesy et al., 1994 | Egypt | 50 | Longitudinal observation study | BSID-I at 6 mo  |  |  |  |
| Kuklina et al, 2004 | Guatemala | 263 | Longitudinal study (at 9 and 12 months) | 17-milestone Gross Motor Development Scale: (median and mean of age of walking) |  |  |  |
| Stanitski et al., 2000 | USA | 986 children (575 male, 471 female | Cohort study | Walking (the mean age month of walking attainment) |  |  |  |
| Iwata et al., 1991 | Japan | 395 | Cross sectional study | Age of first month walking alone (% of achievement) |  |  |  |
| Bottos, et al., 1989 | Italy | index group(n=270) control group(n=154)  | Longitudinal case control study | Crawler on hands and knees: early crawlers, late crawlers, stomach creepers and shufflers by proportion of achievement |  |  |  |
| Capute et al., 1985 | USA | 381 | Longitudinal study | The gross motor milestones ( e.g., roll prone to supine, roll supine to prone, sit with or without aid, creep get to sit, crawl, pull to stand, cruise, walk, walk backward and run)by the mean age and percentage of attainment base on the parental reports. |  |  |  |
| Palisano et al., 1985 | USA | Premature infant(n=23) and fullterm infants (n=20) at 12 months. | Cross sectional study  | The gross motor milestone achievement was measured by the Peabody Developmental Motor Scale (PDMS). |  |  |  |
| Grantham-McGregor et al 1971 | Jamaica | 300 | Longitudinal study | Gross motor milestone: lift head to walk alone (% of achievement) |  |  |  |