

Bone mineral density, pubertal status and ability to walk are associated to fracture incidence in patients with Rett syndrome

Anya Rothenbuhler¹, Laure Esterle¹, AFSR, Najiba Lahlou², Thierry Bienvenu³, Nadia Bahi-Buisson⁴ and Agnès Linglart¹

anya.rothenbuhler@bct.aphp.fr



¹Service d'Endocrinologie Pédiatrique, Université Paris-Sud 11, Hôpital Bicêtre, APHP, Le Kremlin-Bicêtre, France
²Departmentement de Biologie Hormonale, Université Paris-Descartes, Hôpital Cochin, APHP, Paris, France
³Laboratoire de Biochimie et Génétique Moléculaire, Université Paris-Descartes, Hôpital Cochin, APHP, Paris, France
⁴Service de Neuropédiatrie, Université Paris-Descartes, Hôpital Necker Enfants Malades, APHP, Paris, France



Background and Objectives:

Rett (RTT) syndrome is a neurodevelopmental disorder that affects girls almost exclusively. The majority are related to mutations in the MECP2 gene. Patients with Rett syndrome have a high incidence of fractures that can occur at a young age. One of the objectives of this study was to identify clinical, radiographic and biological parameters associated to fracture incidence.

Study design:

89 RTT patients bearing a MECP2 mutation who had no past history of bisphosphonate treatment or orthopedic surgery to the spine were recruited prospectively. The following clinical, radiographic and biological parameters were evaluated: history of fractures and anti-epileptic drugs, ability to walk, BMI, pubertal status, Kerr severity score, daily calorie, calcium and vitamin D intake, bone mineral density (BMD) at the spine and hip using DEXA, X-rays of the spine and urinary calcium excretion.

Results: Main clinical, radiographic and biological characteristics of the studied patients are shown in Table 1. Table 2 shows the differences of these parameters between the patients who had fractures and the patients who have no history of fractures and Table 3 compares BMD between pubertal and non pubertal ambulatory and non ambulatory RTT patients.

Parameter	Value
Number of patients	89
Age (years)	11.8 ± 7.1
Number of patients with fractures	19
Number of patients with scoliosis	60
Kerr score	18 ± 5.2
BMI Z-score	-0.96 ± 1.9
Caloric intake (% of recommended)	94 ± 16
Calcium intake (% of recommended)	86 ± 35
Dose of daily vitamine D (IU)	924 ± 337
Calciuria/creatinuria ratio (mmol/mmol)	0.62 ± 0.86
BMD Z-score at the spine (L1L4)	-2.07 ± 1.4
BMD Z-score at the hip	-2.44 ± 1.56

Parameter	Fracture		P
	+	-	
Number	19	70	
Age (years)	14.3±2.2	11.1±0.7	0.01
BMI Z-score	-1.3±0.5	-0.86±0.2	ns
Kerr score	17±1.2	18±0.6	ns
Caloric intake (% of recommended)	91±4	94±2	ns
Calcium intake (% of recommended)	89±7	85±4	ns
Dose of daily vitamine D (IU)	790±115	728±58	ns
Calciuria/creatinuria ratio (mmol/mmol)	0.9±0.3	0.54±0.1	ns
BMD Z-score at the spine (L1L4)	-2.8±0.3	-1.8±0.2	0.01
BMD Z-score at the hip	-3.2±0.4	-2.2±0.2	0.02

	Pre-pubertal non-ambulatory	Pre-pubertal ambulatory	Pubertal non-ambulatory	Pubertal ambulatory
N	34	28	7	20
Fractures N	5	7	1	6
Age (yrs)	7.7 ± 2	8.8 ± 2	20.5 ± 9.7	19.7 ± 7
Fractures %	15	25	14	30
BMD Z-score at the spine	-2.6 ± 1.1	-1.8 ± 1.1	-1.76 ± 2.6	-1.55 ± 1.4
BMD Z-score at the hip	-3.1 ± 1.4	-1.85±1.6	-2.7±1.6	-2.2±1.5

Conclusions:

Pubertal ambulatory RTT patients have the highest incidence of fractures. Bone mineral density at the spine and the hip measured by DEXA, ambulatory status and pubertal development are related to fracture incidence.

