Bone mineral density in children and adolescents with vertical HIV infection.

Deisi Maria Vargas (MD, PHD)[1], Daniela de Oliveira Prust (MD)[1], José Carlos Pereira Galvão (MD)[2]

1.Department of Medicine. Master Degree Program on Public Health. University of Blumenau

2. HIV Child Daycare - Secretary of Health

BLUMENAU-SC-BRAZIL.

BACKGROUND: Chronic diseases are the main causes of bone mass reduction in childhood and adolescence. Different aspects related to the process of bone acquisition and maintenance may be affected. Studies had point out the presence of bone mass reduction in children and adolescents with HIV infection with association to antiretroviral use, chronological age (CA), weight and serum CD4 T-cell counts. However, others do not.

OBJECTIVE: To evaluate bone mineral density in children and adolescents with vertically HIV infection and associated factors.

METHODS: Observational study in 46 vertically HIV-infected children and adolescents aged 7.7 ±3.5 years (17 males). Age, sex, weight, height, CDC clinical categories, bone mineral density (BMD) at lumbar spine (DXA), blood calcium, phosphorus, alkaline phosphatase (AP), CD4 and CD8 T-cell counts, IGF-1, viral load and uCa/Creat were evaluated. BMD, weight and height were expressed in Z-score. Reduced BMD was defined as Z-score ≤ -2 DP. Linear regressions, U-Mann-Whitney, Kruskal-Wallis and Fisher tests were used in statistical analyses. Human Ethics Comity approved the study.

RESULTS: Reduced bone mass occurred in 13.0%. These patients had higher CA (12.3 *vs* 7.5; p<0.01), AP (232.7 *vs* 165.4; p<0.01) and IGF-1 (464.8 *vs* 195.4; p<0.01); and lower CD4 (356.8 *vs* 761.8; p<0.01) and uCa/Creat (0.1 *vs* 0.6; p<0.01) (Table 1). BMD correlated positively with CD4 and negatively with CA (Figure 1) and IGF-1. In multivariate analysis BMD correlated with CD4, CA, AP, uCa/Creat and IGF-1 (r=0,950; p<0,001). Adolescents had higher proportion of reduced BMD and lower BMD (Table 2). Lower BMD was also observed in patients classified in C clinical category (-0.98 *vs* -0.73 *vs* -2.33 category A, B and C respectively; p=0.05)

Table 1: Clinical and biochemical data according to BMD group.

	Total	Groups		
		Low Bone Mass	Normal Bone Mass	p*
	(n=46)	(n=6)	(n=40)	Value
Age (year)	8.1 ± 3.6	12.3 ± 2.9	7.5±3.3	< 0.01
Weight for age (Z-score)	-0.8 ± 0.8	-1.0 ± 0.8	-0.8 ± 0,9	NS
Height for age (Z-score)	-1.1 ± 1.8	-1.2 ± 0.6	-1,1 ± 1.9	NS
CD4 count (cells/mm^3)	709.0±517.8	356.8 ± 240.5	761.8 ± 529.1	< 0.01
CD8 count (cells/mm^3)	1,256.7 ±613.6	1,153.1± 681.1	1.272.2 ± 610.7	NS
Viral load (copies/ml)	35,157.7 ±71,830.7	4,980.0 ± 5,672.8	39,681.0 ±76,080.4	0.05
Antiretroviral therapy (months)	43.7± 33.2	51.1 ± 34.2	42.5± 33.4	NS
Alkaline Phosphatase (UI/L)	176.6± 64.4	232.7 ± 33.7	165.4 ± 63.5	< 0.01
Ca/Creat $_u$ (mg/mg)**	0.5± 0.8	0.1± 0.1	0.6± 0.9	<0.05
IGF-1 (ng/ml)***	249.3± 187.0	464.8± 295.6	195.4± 10.6	<0.05
PCR (mg/dl)#	0.3± 0.3	0.4± 0.5	0.3± 0.3	NS
BMD (Z-score)	-0.96 ± 1.10	-3.00 ± 0.60	-0.65 ± 0.70	<0.001

* U-Mann-Whitney; ** urinary calcium/creatinine ratio; *** insulin like growth factor # n= 27.

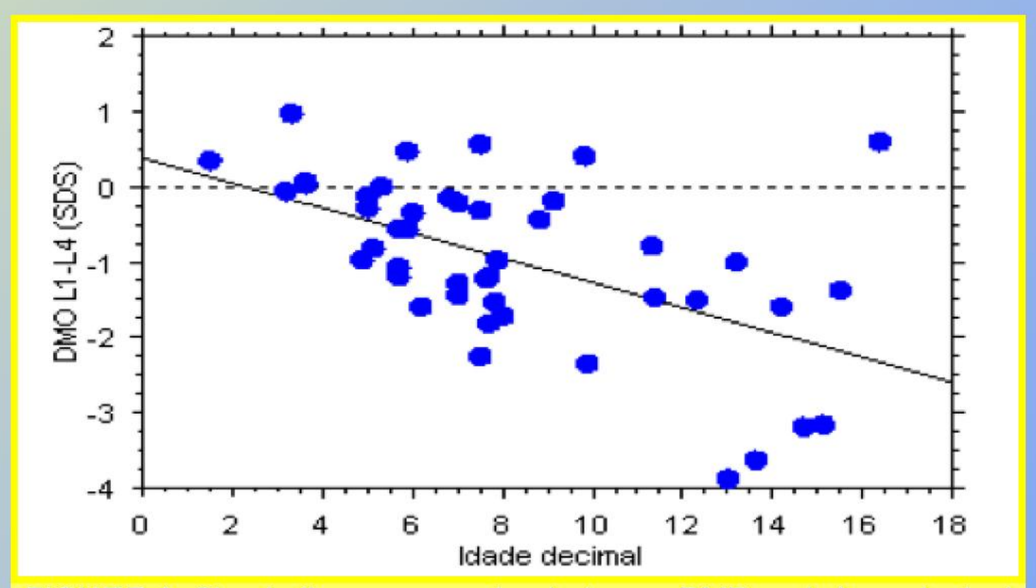

FIGURE 1: Simple linear regression between BMD and chronological age.

Table 2: Bone mass in relation to age group.

	Normal Bone Mass n (%)	Low Bone Mass n (%)	BMD Z-score media ±DP
Preschoolers (2-5 years)	15 (37.5%)	0 (0%)	- 0.31 ±0.61
Schoolers (6-9 years)	17 (42.5%)	2 (33.3%)	- 1.11 ±0.79
Adolescents (10-19 years)	7 (17.5%)	4 (66.7%)*	- 1.91 ±1.38**
Total	40 (100%)	6 (100/%)	- 0.96 + 1.10

* Fisher p<0.01; ** Kruskal Wallis p<0.001.

CONCLUSIONS: Vertical HIV infection are associated with reduced bone mass, especially during adolescence. The association of low bone mass to low CD4 and higher chronological age suggests that duration of infection and clinical conditions affects bone mineral acquisition in this group.

REFERENCES

1.Mora S, Sala N, Bricalli D, Chiuimello G, Zuin G, Vigano A. Bone mineral loss through increased bone turnover in HIV-infected children treated with highly active antiretroviral therapy. AIDS. 2001; 15:1823-1829. **2.** Mora S, Zamproni I, Beccio S, Bianchi R, Giacomet Vigano A. Longitudinal changes of bone mineral density and metabolism in antiretroviral-treated human immunodecidiency vírus-infected children. J Clin Endocrinol Metab 2004; 89:24-28. **3**. Vargas DM, Noriler K, Pissatto M; Galvão JC, Gallo AM, Pinho MSL. Bone mass in HIV infected children. In: IOF World Congress on Osteoporosis, 2004, Rio de Janeiro. Osteopor Int 2004; 15:S78-S78. **4**. Arpadi S, Horlick M, Thornton J, Wang J, Kotler D. Bone Mineral Content Is Lower in Prepubertal HIV-Infected Children. J Acquir Immune Defic Syndr 2002; 29:450-454. **5**.Jacobson DL, Spiegelman D, Duggan C, Weinberg GA, Bechard L, Furuta L, et al. Predictors of Bone Mineral Density in Human Immunodeficiency Virus-1. J Pediatr Gastroenterol Nutr 2005; 41:339-343. **6.** Gafni RI, Hazra R, Reynolds JC, Maldarelli F, Tullio AN, DeCarlo E et al. Tenofovir disoproxil fumarate and an optimazed background regimen of antiretroviral agents as salvage therapy: impact on bone mineral density in HIV-infected children. Pediatr 2006;118:e771-e718. **7**. Rosso R, Vignolo M, Parode A, Di Biagio A, Sormani MP, Bassetti M et al. AIDS Res Human Retrovir 2005; 21:927-932. **8**.Stagi S, Bindi G, Galluzzi F, Galli L, Salti R, Martino M. Changed bone status in human immunodeficiency virus type-1 (HIV-1) perinatally infected children is related to low serum free IGF-1. Clin Endocrinol 2004;61:692-699. **9.** Jacobsen DJ, Lindsey JC, Gordon CM, Moye J, Hardin DS, Mulligan K et al. Total body and spinal bone mineral density across Tanner stage in perinatally HIV-infected and uninfected children and youth in PACTG 1045. AIDS 2010;24:687-696. **10**. Mora S, Zamproni I, Cafarelli L, Giacomet V, Erba P, Zuccotti G et al. Alterations in circulating osteoimmune factors may be resposnsible for high bone resorption rate in HIV-infected children and adolescents. AIDS 2007; 21:1129-1135..**11** Bolland MJ, Wang TKM, Grey A, Gamble GD, Reid IR. Stable bone mineral density in HAART-treated individuals with HIV: a meta-analysis. Endocr Care 2011; 96:2721-2731.**12**. Lima LRA, Silva RCR, Giuliano ICB, Sakuno T, Brincas SM, Carvalho AP. Bone mass in children and adolescents infected with human immunodeficiency virus. J Pediatr.2013;89(1):91–99.

Grant supported by PIBIc-CNPq

E-mail: deisivargas@furb.br

Rua Antônio da Veiga, 140. Sala L-101. Campus I. Bairro Victor Konder. CEP 89030-0903 – Blumenau/SC

ESPE 2015 208--P2

Bone, Growth Plate and Mineral Metabolism

Deisi Maria Vargas

DOI: 10.3252/pso.eu.54espe.2015

Poster presented at: 54th Annual Meeting 1-3 October ESPE 2015 BARCELONA European Society for Paediatric Endocrinology

PosterSessionOnline.com