Is Plasma C-Type Natriuretic Peptide Level Available for Typing and Diagnosis of Skeletal Dysplasia Cases?

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INTRODUCTION:

Skeletal dysplasia is a heterogeneous group of diseases leading to abnormal enchondral ossification and typing is quite complicated. C-type natriuretic peptide (CNP) has been proven to be effective in bone development. CNP levels were found high in some of the skeletal dysplasia types.

OBJECTIVE:

- ✓ **To evaluate the possibility that CNP, which is effective in bone development, can be used as a marker for skeletal dysplasia types**
- ✓ **To investigate the role CNP on categorizing the types of skeletal dysplasia**

METHOD:

Inclusion Criteria

>6 months - <18 years

Exclusion Criteria

- **Growth Hormone Treatment**
- **Systemic disease finding causing organ failure**
- **Skeletal dysplasia with organ involvement and mental retardation**
- **Diagnosed with Ostegenezis Imperfecta**

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Patient Group (n): 37
Control Group (n) : 49
All Subjects
- **CNP (ng/ml)**

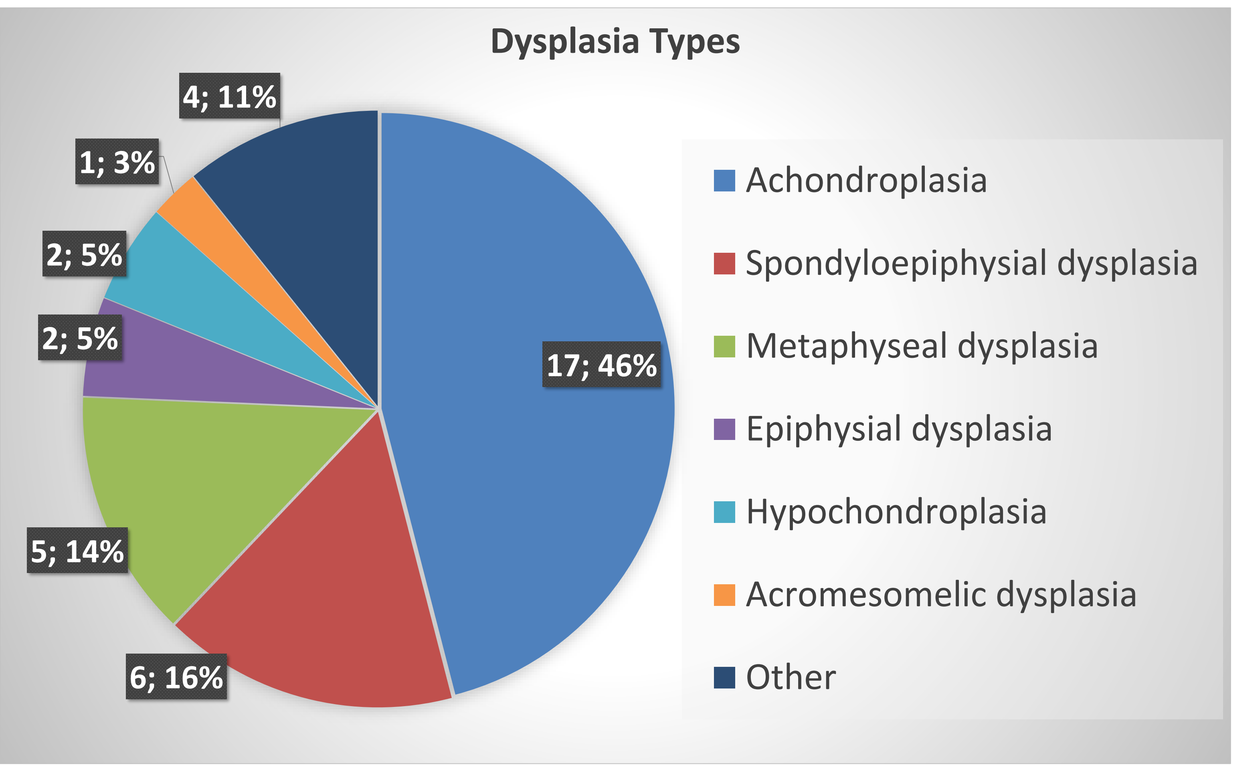
(ELISA method / EDTA blood samples at -80 ˚C)
Patient Group
- **Bone surveys**
- **IGFBP, IGF-1 levels and SD**
- **Puberty stages**
- **Growth rate (cm/year)**

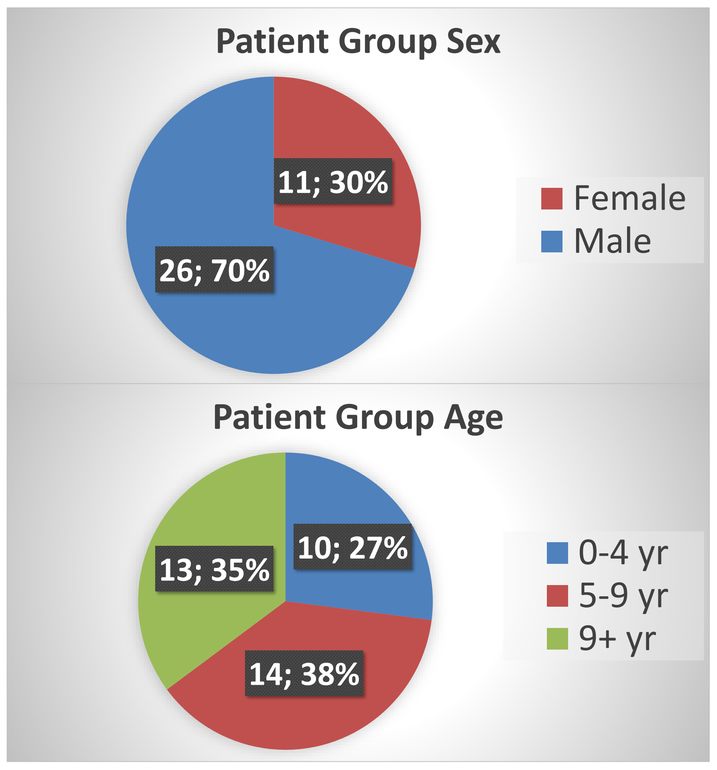
Mutation Analysis in the Patient Group:

FGFR3 mutation in two hypochondroplasia patients (+):
- ❖ **c. 1620 C>G (p.N540K) mutation**
- ❖ **c.1626 C>G (p.N542K) mutation**

➢ ***FGFR3 mutation in nine achondroplasia patients (+):***
- ❖ **c. 1138 G> A (p.G379R) mutation**

FINDINGS:





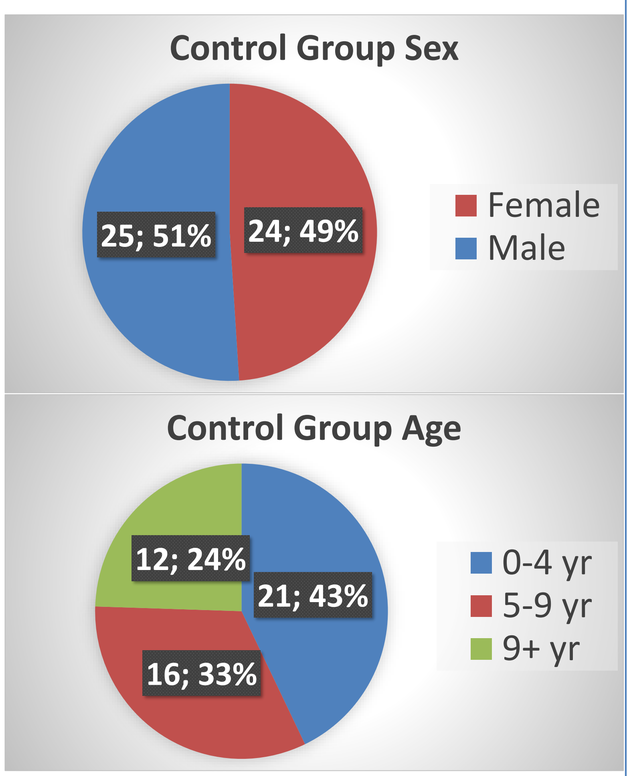


Table 1: Auxological Measurements of Patient and Control Group

Variables	Group	Mean ± SD (n)	Median [min ; max]	p
Height SD	Patient	-4,58±2.87 (n=37)	-4,57 [-14,73 ; 1,93]	<0,001
	Control	0,05±0.79 (n=49)	0,04 [-1,21 ; 1,44]	
Sitting Height SD	Patient	-2,44±2.25 (n=36)	-2,115 [-9,72 ; 0,47]	<0,001
	Control	-0,19±0.94 (n=45)	-0,21 [-1,75 ; 2,21]	
Head Circ. SD	Patient	2±7.32 (n=37)	0,56 [-2,63 ; 43,6]	0,034
	Control	-0,07±0.65 (n=49)	-0,16 [-1,47 ; 1,55]	
BMI SD	Patient	1,13±1.71 (n=37)	1,08 [-5,06 ; 4,23]	<0,001
	Control	0,18±1.19 (n=49)	0,12 [-1,95 ; 6,06]	
Sit.Ht./Ht. SD	Patient	5,12±4.00 (n=36)	4,265 [-1,11 ; 14,56]	<0,001
	Control	-0,41±1.17 (n=45)	-0,5 [-2,2 ; 2,21]	

Table 2: Auxological Measurements of Patient with Achondroplasia and Control Group

Variables	Group	Mean ± SD (n)	Median [min ; max]	p
Height SD	Ach.	-4,58±2.87 (n=37)	-4,57 [-14,73 ; 1,93]	<0,001
	Control	0,05±0.79 (n=49)	0,04 [-1,21 ; 1,44]	
Sitting Height SD	Ach.	-2,44±2.25 (n=36)	-2,115 [-9,72 ; 0,47]	<0,001
	Control	-0,19±0.94 (n=45)	-0,21 [-1,75 ; 2,21]	
Head Circ. SD	Ach.	2±7.32 (n=37)	0,56 [-2,63 ; 43,6]	<0,001
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Sit.Ht./Ht. SD	Ach.	5,12±4.00 (n=36)	4,265 [-1,11 ; 14,56]	<0,001
	Control	-0,41±1.17 (n=45)	-0,5 [-2,2 ; 2,21]	

Table 3: CNP (ng/ml) Comparison between Patient, Achondroplasia and Control Groups

Variables		Mean ± SD (n)	Median [Min;Max]
CNP (ng/ml)	Ach.	1,87±1,6(n=17)	1,79 [0,31 ; 6,59]
	Patient	1,31±1.40 (n=37)	0,42 [0,31 ;6,59]
	Control	1,04±1.40 (n=49)	0,31 [0,31 ; 5,72]

❖**There isn't any difference on the CNP (ng/ml) between the Patient group and Control group (p=0.20), whereas in the achondroplasia group, CNP (ng/ml) was found to be high (p=0.032).**

Table 4: Types of skeletal dysplasia and CNP (ng/ml)

Types of Skeletal Dysplasia	N (%)	Mean ± SD	Median	Min	Max
Achondroplasia	17(45.9%)	1,79±1,64	1.87400	0.31	6.59
Spondyloepiphysial dysplasia	6 (16.2%)	1.08±1.03	0.60550	0.31	2.78
Metaphyseal dysplasia	5(13.5%)	1,02±1,53	0,31	0,31	3,76
Epiphysial dysplasia	2(5.4%)	0,31±<0,01	0,31	0,31	0,31
Hypochondroplasia	2(5.4%)	0,54±0,32	0,54	0,31	0,76
Chromosomal dysplasia	1(2.7%)	0,31±<0,01	0,31	0,31	0,31
Other	4(10.8%)	1,07±1,04	0,73	0,31	0,76

Conclusion: There wasn't any difference between patient and healthy CNP levels but CNP levels were higher in achondroplasia patients. extensive clinical trials and studies of detailed molecular genetic analyses are needed in order to use plasma levels of CNP as a marker for the diagnoses and typing of skeletal dysplasias.

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