

THE "EXTERNAL GENITALIA SCORE"

A EUROPEAN MULTICENTER VALIDATION STUDY

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INTRODUCTION

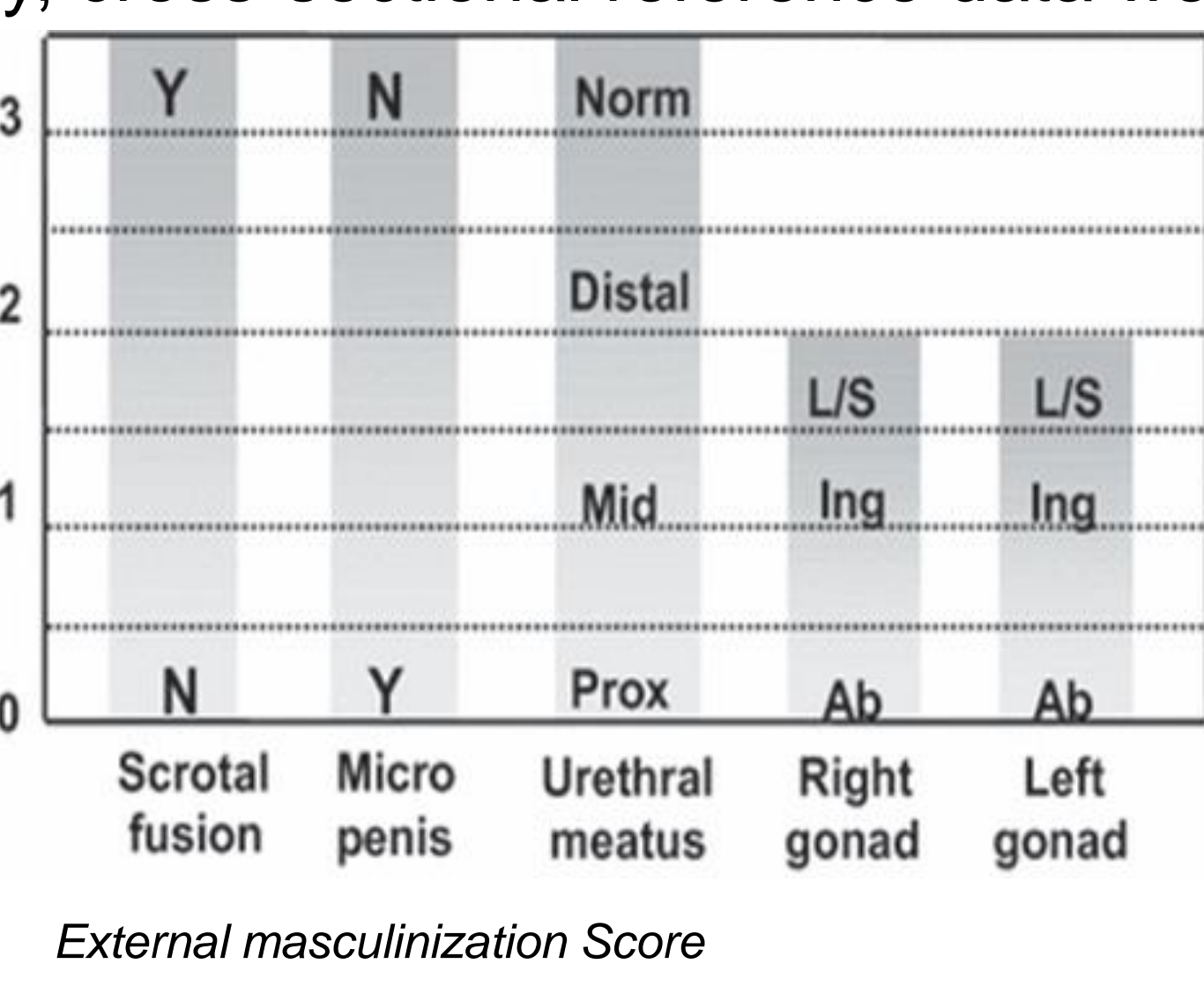
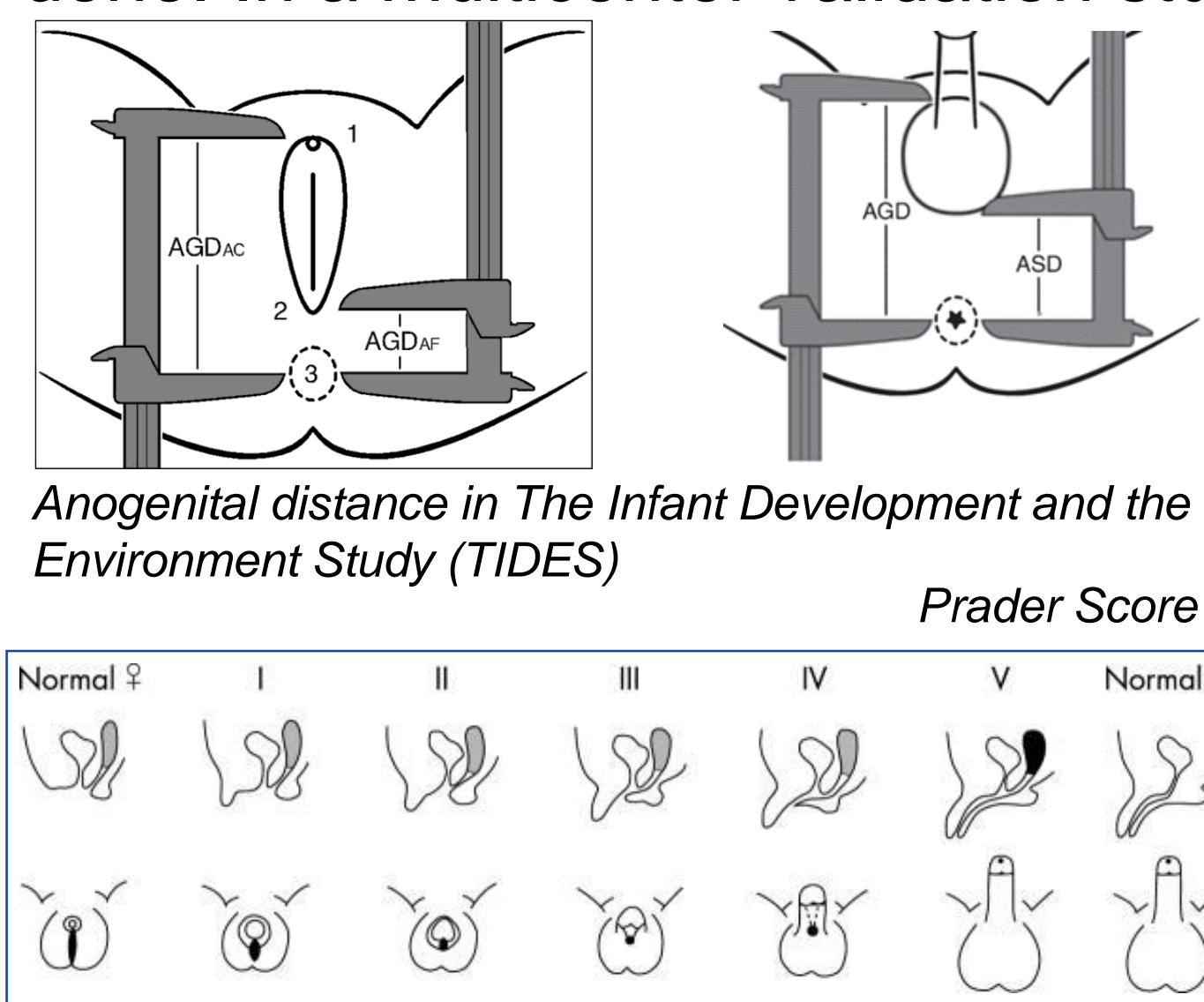
For the initial work-up of a child with DSD a detailed description of the external genitalia should be recorded. Until now the Prader Scale (PS) and External Masculinization Score (EMS) are used. The "External Masculinization Score" (EMS) is an objective method to describe undervirilized genitalia in male infants. A standardized genital assessment that captures the appearance of the genitalia across the phenotypic spectrum from female to male is needed at diagnosis and during follow up and can be used in established international registries enabling clinical research studies. The "external genitalia score" (EGS) was developed by working group 1 of COST Action BM1303. The ano-genital distance (AGD) is a sensitive index of androgen action during fetal development.

OBJECTIVES

Validation of the External Genitalia Score. Presentation of normal values for premature and term infants, babies up to 2 years and in babies with atypical genitalia.

METHODS

EGS was compared to Prader Score and EMS. Ano-genital distances were measured using the TIDES protocol and video training. Intra- and inter-observer variability of the different scoring systems and AGD's were studied in infants with typical and atypical genitalia. Repeat measurements for each distance were done. In a multicenter validation study, cross-sectional reference data were obtained.



EGS	LABIO-SCROTAL FUSION	GENITAL TUBERCLE	URETHRAL MEATUS	LOCATION RIGHT GONAD	LOCATION LEFT GONAD
3	fused	≥ 31	typical male coronal glandular		
2,5		26-30			
2			penile		
1,5	posterior fusion	21-25	peno-scrotal	labio-scrotal	labio-scrotal
1		10-20	scrotal	inguino-scrotal	inguino-scrotal
0,5			perineal	inguinal	inguinal
0	unfused	≤10	typical female	impalpable	impalpable

Stretched penile length

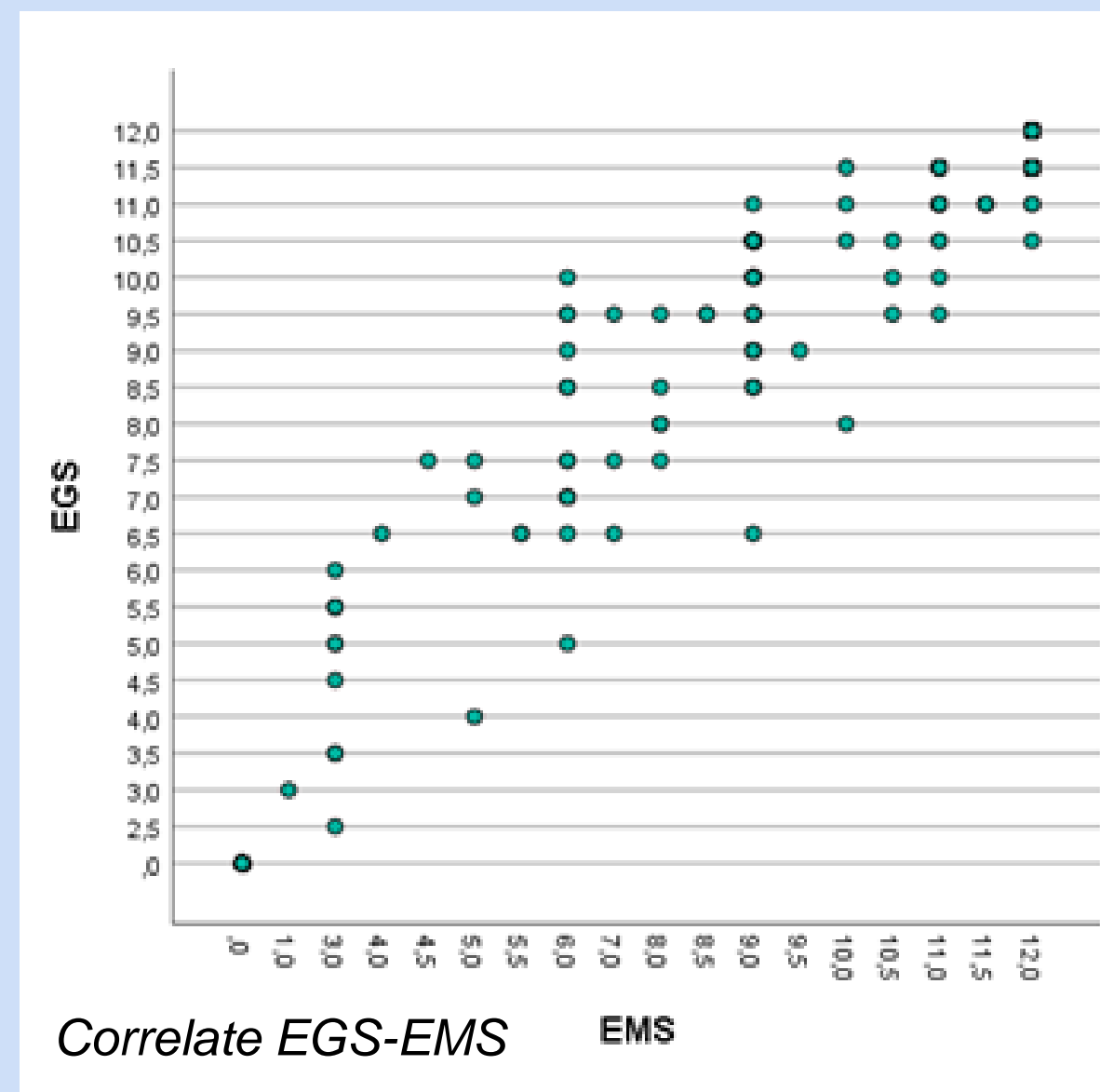
Gestational age (weeks)	No	SPL mean	SD	95 % CI
<28	7	19,7	4,9	15,1-24,2
28-33	20	27,7	4,7	25,5-30,0
33-37	28	28,2	4,7	26,4-30,1
>37	174	31,2	5,4	30,4-32

Age Group (months)	No	SPL mean	SD	95 % CI
0-1	229	30,2	5,7	29,5-30,9
1-6	118	31,2	5,6	30,1-32,2
6-12	45	34,0	5,5	32,3-35,6
12-24	14	37,3	4,1	35,0-39,7

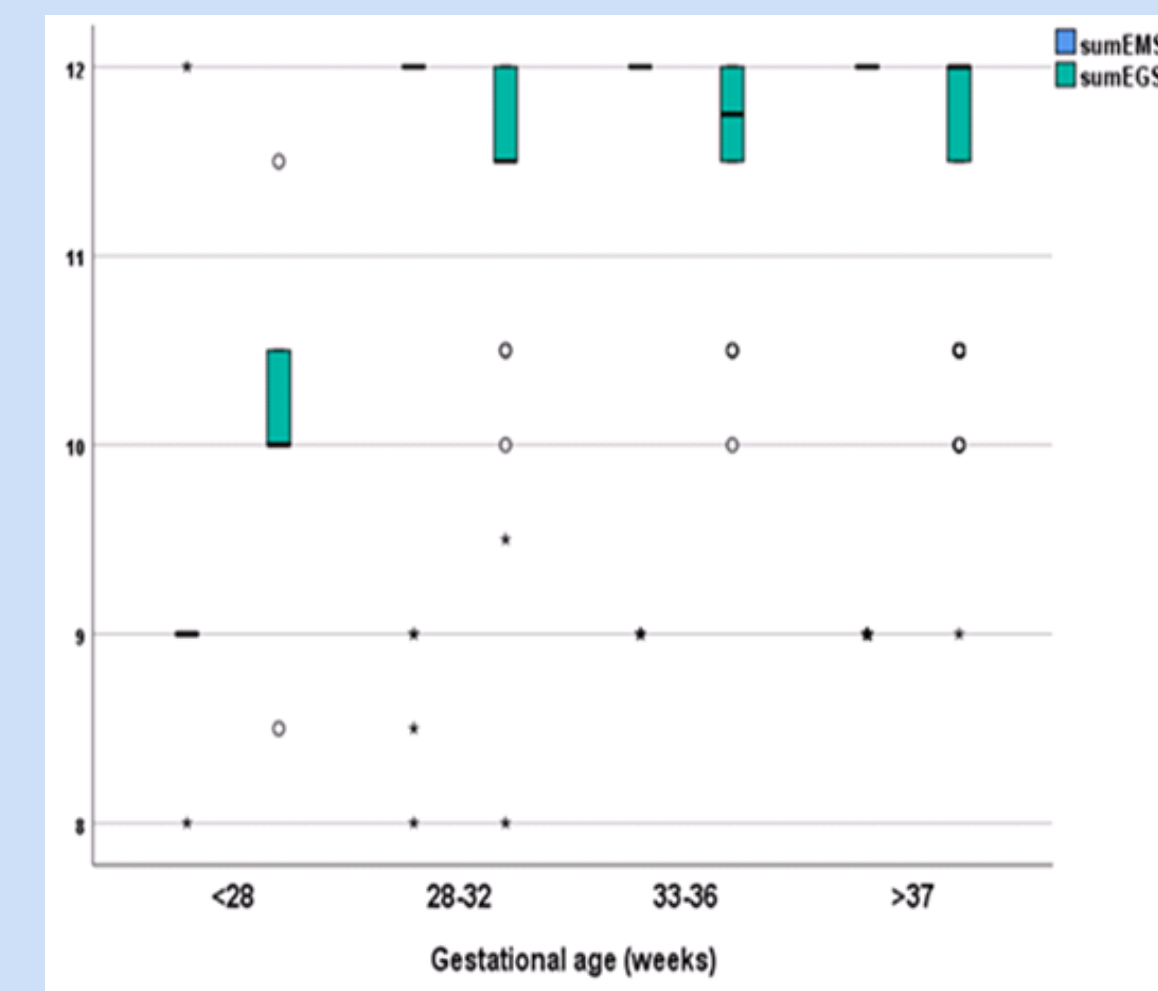
RESULTS

Inter-observer reproducibility of EGS in typical and atypical genitalia is excellent, being 1 and 0,98 respectively (95%RI 0,97-0,99).

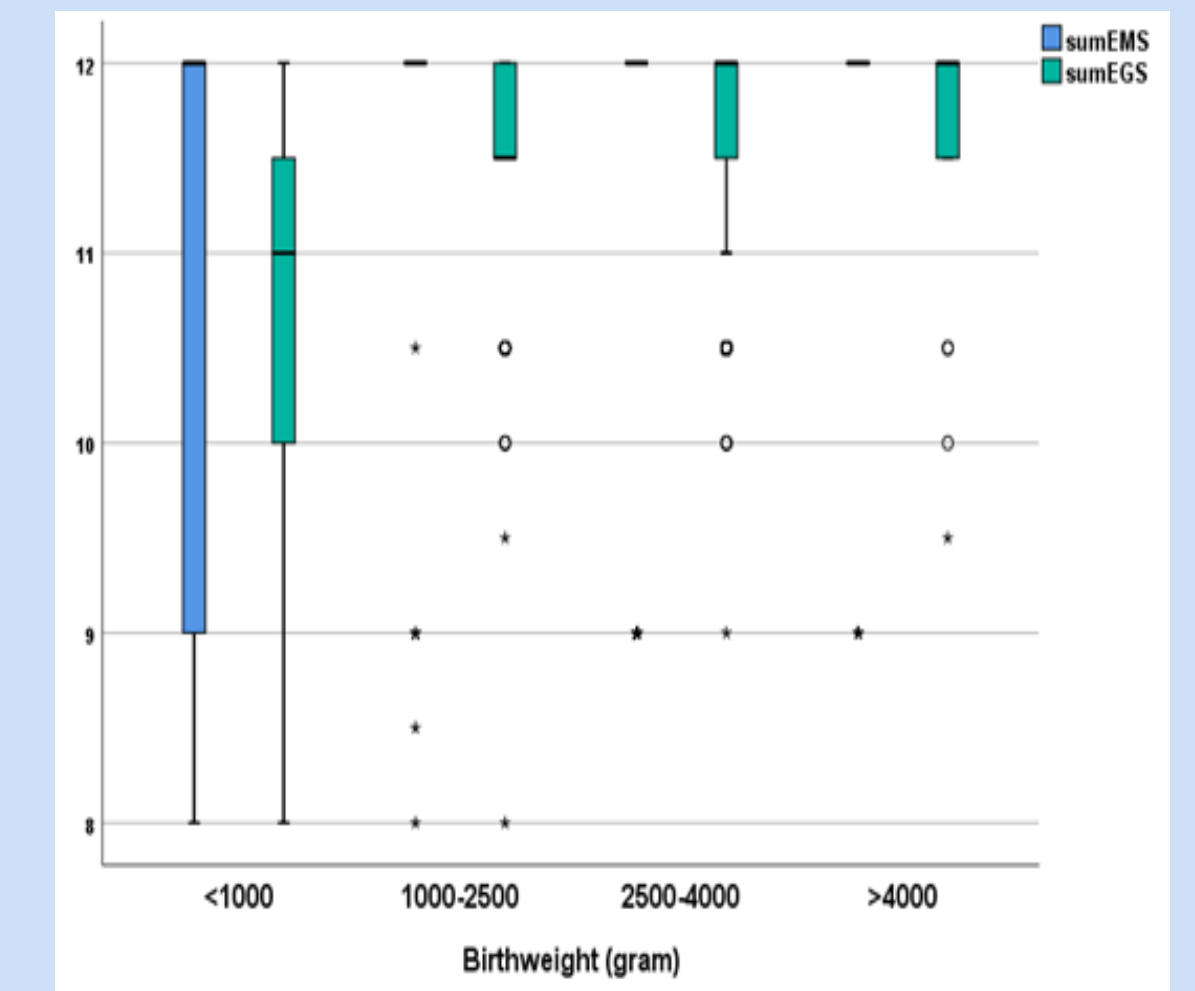
Characteristic of patients	Count
Sex	
Female	426
male	433
Gestational age (w)	
<28	35
28-32,9	58
33-36,9	76
>37	690
Birthweight (gr)	
<1000	36
1000-2500	117
2500-4000	619
>4000	76
AGA/SGA	
AGA	800
SGA	59
Age at exam (m)	
0-1	496
1-6	228
5-12	87
12-24	38
Study center	
Ghent	239
Copenhagen	291
Katowice	104
Messina	122
Stockholm	90
Bern	50
Vienna	47
Patient groups	
46,XX, female	424
46,XY, male	429
46,XX DSD	8
46,XY DSD	35
Sex chromosome DSD	9
46,XY, undervirilization	45



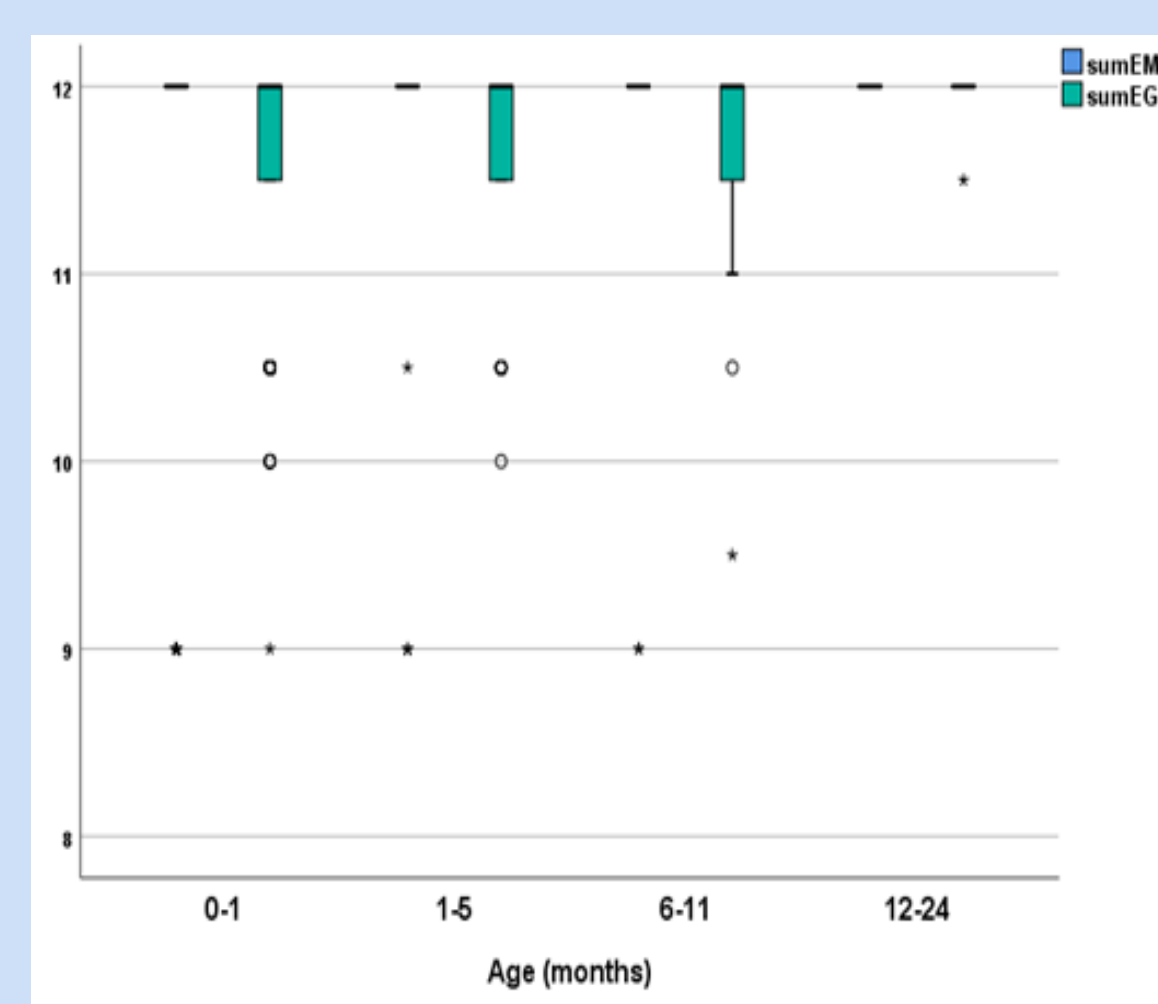
EMS correlates positively with EGS (Spearman's $r=0,97$, $P<0,05$)



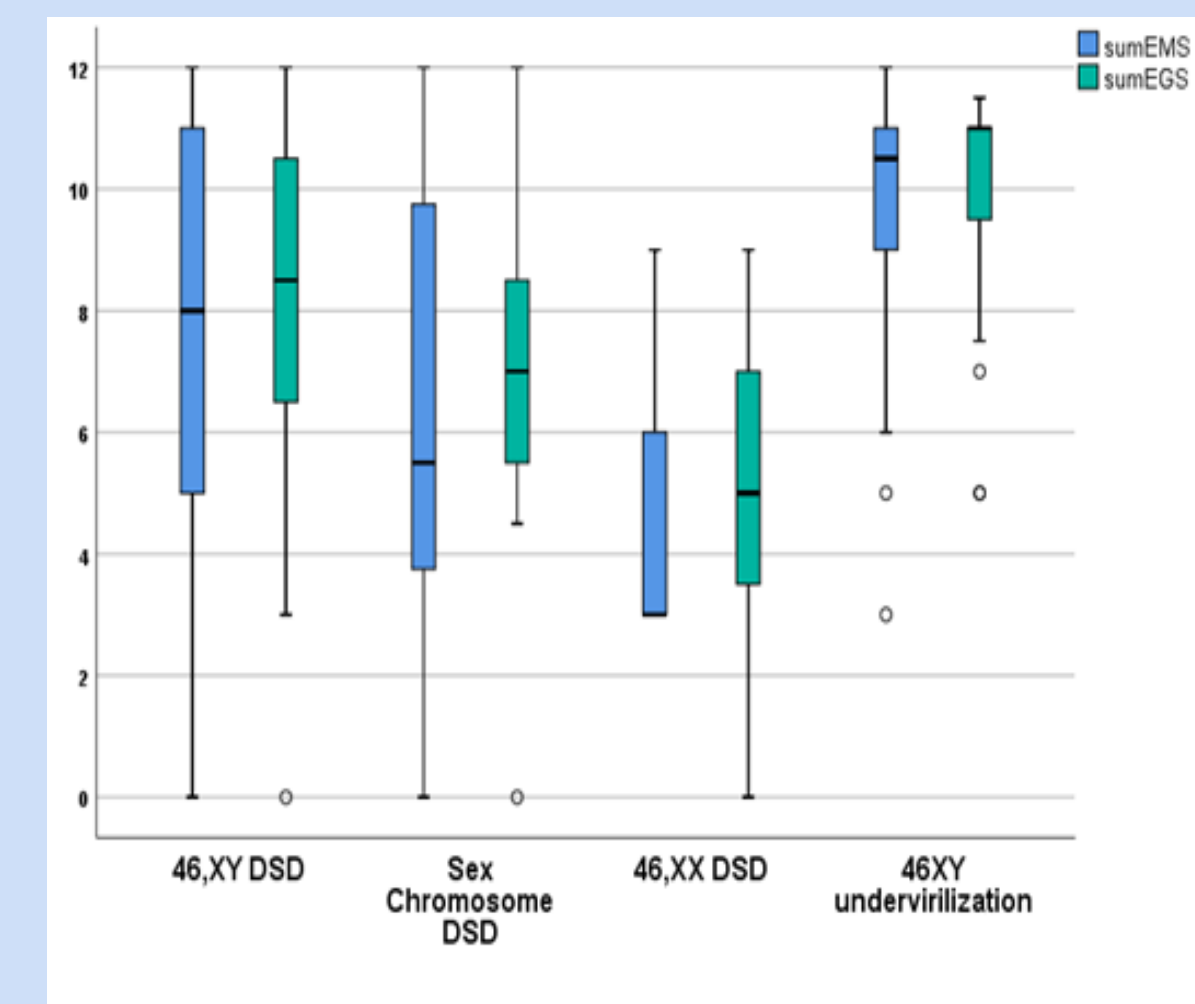
Gest. age (weeks)	No	EGS median	P10	P90
<28	5	10	8,5	11
28-33	21	11,5	9,6	12
33-37	26	11,7	10,5	12
fullterm	171	12	10,5	12



birthweight (gram)	No	EGS median	P10	P90
<1000	22	11	8,8	12
1000-2500	63	11,5	10,5	12
2500-4000	292	12	10,5	12
>4000	49	12	11,5	12



Age groups (months)	No	EGS median	P10	P90
0-1	233	12	10,5	12
1-6	117	12	11,5	12
6-12	43	12	11,2	12
12-24	16	12	11,8	12



	No	EGS median	P10	P25	P75	P90
46,XY DSD	35	8,5	4,9	6,5	10,5	11,7
Sex chrom DSD	9	6,5	0	2,3	8,5	
46,XY undervirilized	45	11	7,5	9,5	11	11,5
46,XX DSD	8	7	2,5	3,5	7,4	

The ano-genital ratio in male and females followed a normal distribution. The anogenital ratio does not correlate with anthropometric variables or gestational age. AGDratio as/ap correlates positively with the EGS (Spearman's $r=0,19$, $p<0,05$) AGDratio as/ap in 46,XY DSD correlates positively with the EGS (Spearman's $r=0,47$, $p<0,05$) AGDas/ap in 46,XY typical genitalia is significantly different from AGDas/ap in 46,XY atypical genitalia ($t=3,9$; $p<0,05$; CI 0,03-0,08)

AGD-ratio	46,XY Typical genitalia	46,XY DSD	46,XY undervirilized
AGDas/ap	418 0,50; 0,09	22 0,47; 0,1	43 0,42; 0,1

AGD-ratio	46,XX Typical genitalia	46,XX DSD
AGDaf/ac	415 0,39; 0,07	5 0,45; 0,1

CONCLUSIONS

The EGS can describe the phenotypic spectrum from female to male in premature and term infants up to 24 months. The AGD-ratio correlates positively with EGS in male infants.



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REFERENCES

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