

Factors Associated with Helmet Therapy Outcomes in Positional Plagiocephaly



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Introduction

- Helmet therapy is considered as a treatment for infants with positional plagiocephaly. Although some studies suggest anterior fontanelle (AF) size may also affect treatment outcomes, evidence and influence remains unclear. The aim of this study is to assess the impact of anterior fontanelle size on the effectiveness of helmet therapy, with the goal of determining the optimal timing and patient criteria for treatment.

Materials and Methods

Participants

- Retrospective study of 94 infants treated with helmet therapy for positional plagiocephaly to our institution between Jan. 2020 and Dec. 2021

Patient Stratification

- Age at Initiation:
 - Early treatment group ≤ 6 months
 - Late treatment group > 6 months
- Severity (SAF Quartiles):
 - Mild $\leq 25\%$
 - Moderate 25-75%
 - Severe $\geq 75\%$

Intervention

- Treatment: Cranial Remodeling Orthosis (Helmet Therapy)
- Objective: Correction of cranial asymmetry

Outcome Measures

- CVA (Cranial Vault Asymmetry): The absolute difference between the two diagonal cranial diameters.
- CVAI (Cranial Vault Asymmetry Index): The percentage ratio used to quantify the severity of the plagiocephaly.

Results

Table 1. Baseline demographics

Variable	Total (n=94)	$\leq 6m$ (n=63)	$> 6m$ (n=31)
Age (Months)	5.83 \pm 1.87	4.76 \pm 0.93	8.00 \pm 1.34
Sex			
Male (%)	48 (51.1)	33 (52.4)	15 (48.4)
Female (%)	46 (48.9)	30 (47.6)	16 (51.6)
Size of anterior fontanelle (SAF, mm)	39.57 \pm 8.70	40.07 \pm 8.05	38.55 \pm 9.96
Head Measurements			
CVA (mm)	11.5 \pm 4.10	11.50 \pm 4.02	11.49 \pm 4.31
CVAI (%)	7.13 \pm 2.66	7.26 \pm 2.64	6.87 \pm 2.71
ASR	0.88 \pm 0.06	0.88 \pm 0.56	0.89 \pm 0.05
PSR	0.93 \pm 0.04	0.93 \pm 0.04	0.92 \pm 0.04
Total volume (cm ³)	831.94 \pm 107.44	782.00 \pm 84.74	933.43 \pm 71.12

Figure 1. Comparison of Cranial Vault Asymmetry Between Age Groups ($\leq 6m$ vs. $> 6m$) Over Time.

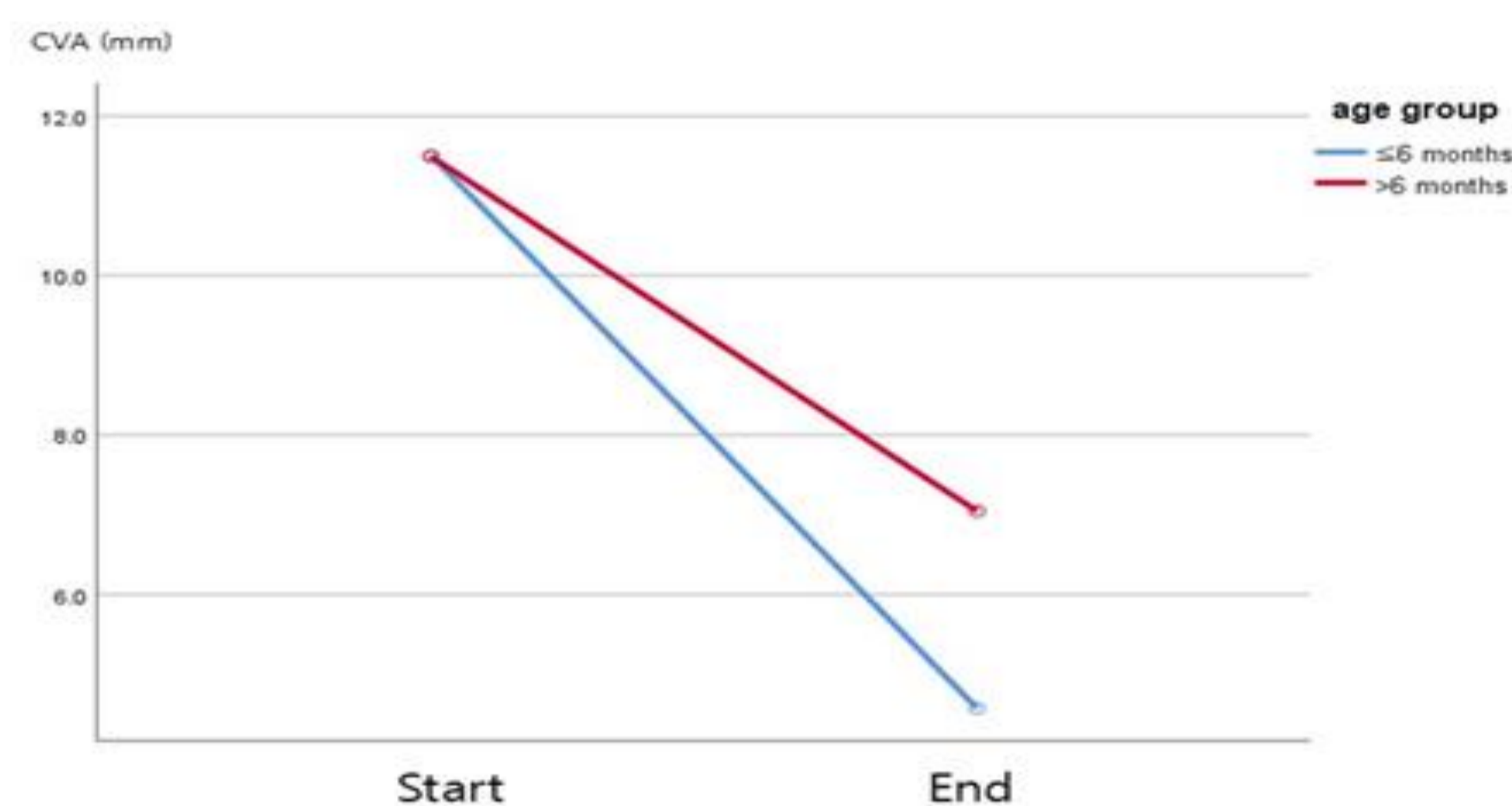


Table 2. Outcome parameters according to age groups : Within-group changes and between-group comparison.

	≤ 6 months (n=63)			> 6 months (n=31)			Between-group comparison† ($\leq 6m$ vs. $> 6m$)	
	Start	End	p-value	Start	End	p-value	Start p-value	End p-value
CVA (mm)	11.50 \pm 4.02	4.57 \pm 2.30	<0.001	11.49 \pm 4.31	7.04 \pm 3.85	<0.001	0.907	0.003
CVAI (%)	7.26 \pm 2.64	3.10 \pm 1.55	<0.001	6.87 \pm 2.71	4.45 \pm 2.44	<0.001	0.652	0.011
Reduction rate	0.81 \pm 0.43			0.48 \pm 0.36			0.03	
Growth rate	4.87 \pm 1.60			2.96 \pm 1.23			<0.001	
Duration (mo.)	5.51 \pm 1.79			6.16 \pm 2.83			0.639	

Table 3. Outcome parameters according to anterior fontanelle size.

	SAF group							
	SAF $\leq 25\%$		25%<SAF<75%		75% \leq SAF		F	P-value
	M	SD	M	SD	M	SD		
CVA-Start (mm)	10.99	4.48	11.27	3.83	12.50	4.28	2.343	0.310
CVA-End (mm)	5.75	3.45	5.22	3.02	5.40	3.08	0.261	0.878
CVAI-Start (%)	6.90	2.98	6.92	2.47	7.82	2.72	2.750	0.253
CVAI-End (%)	3.78	2.29	3.45	1.93	3.55	1.89	0.190	0.909

Conclusion

- Our findings indicate that anterior fontanelle size is not a predictor of helmet therapy outcomes in positional plagiocephaly. Early initiation of helmet therapy (≤ 6 months) remains the most critical factor for achieving optimal results.