A STUDY OF TRANSFORMING GROWTH FACTOR – BETA IN CHILDREN WITH ACUTE LEUKEMIA IN ALEXANDRIA UNIVERSITY CHILDREN'S HOSPITAL

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INTRODUCTION

Leukemia arises from the clonal proliferation of abnormal hematopoietic cells, leading to disruption of normal marrow function and marrow failure.

Transforming growth factor-β (TGFβ) family members are structurally and functionally related cytokines that have diverse effects on the regulation of cell fate during embryonic development and in the maintenance of adult tissue homeostasis.

The functions of TGFβ are not limited to the regulation of proliferation, differentiation, apoptosis, epithelial–mesenchymal transition, and metastasis of cancer cells. Dysregulation of TGFβ family signaling can lead to a plethora of developmental disorders and diseases, including cancer, immune dysfunction, and fibrosis.

TGFβ as a target for cancer therapy. Thus, by combining chemotherapy, targeted therapy, radiotherapy, and immunotherapy with TGFβ-targeting drugs, treatments can be made more efficient by improving antitumor efficacy and reducing therapy resistance.

AIM OF THE WORK

The aim of this study was to:

Evaluate Transforming growth factor- beta (TGFβ) in children with acute leukemia before induction of remission and during maintenance chemotherapy.

To find the relationship (if any) of TGFβ to type and risk stratification of leukemia

PATIENTS AND METHODS

This study was conducted on children aged 1-14 years with acute leukemia, either acute lymphoblastic leukemia (ALL) or acute myeloid leukemia (AML), and was followed up for at least 2 months. In this study, 20 children who were newly diagnosed with acute leukemia before induction of remission and or on maintenance chemotherapy. It also included 20 healthy children matching in age and sex with the previous group and served as controls. Detailed history taking and signs of relapse was included with laboratory results.

RESULTS

The TGF-β ranged from 1.49 to 45.18 pg/ml, with a median of 42.09 pg/ml, 95% CI of the median of 40.66-42.39, and 25th Percentile –75th Percentile of 40.36-42.44 pg/ml.

In the Acute Leukemia Group, 18/20 (90.00%) were ALL and 2/20 (10.00%) were AML.

Risk stratification of ALL (n=18)

Low Risk stratification was 5/18 (27.78%), and high risk was 13/18 (72.22%)

Risk stratification of AML (n=2)

Low risk stratification was 1/2 (50.00%), and high risk was 1/2 (50.00%)

Leukemia at different stages of treatment

Studying Leukemia at different stages of treatment revealed that 45.00% were in the Induction stage and 55.00% were in the maintenance stage; out of them, 36.36% were early maintenance, and 63.64% were late maintenance. Nine (45%) children showed occurrence of relapse in ALL during induction.

Table 1: Comparison of serum TGF-β (pg/ml) of the two studied groups

	Acute leukemia (n=20)	Control (n=20)	Test of significance p value
TGF-β (pg/ml)			
Min.–Max	1.49–45.18	0.00–43.90	$Z_{(MW)}$=1.353
Mean±SD	36.09±14.84	25.50±21.16	p=.176
Median	42.09	41.35	
95% CI of the median	40.66–42.39	0.31–42.57	
25th Percentile–75th Percentile	40.36–42.44	0.27–42.59	
Risk stratification of ALL (n=18)			
Low Risk	5 (27.78%)		
High Risk	13 (72.22%)		
Risk stratification of AML (n=2)			
Low Risk	1 (50.00%)		
High Risk	1 (50.00%)		
Leukemia at different stages of treatment			
Induction	9 (45.00%)		
Maintenance	11 (55.00%)		
Early Maintenance	4 (36.36%)		
Late Maintenance	7 (63.64%)		
Distribution of leukemic cases according to occurrence of relapse	9 (45%)		

Table 2: Comparison of serum TGF-β (pg/ml) at timing of sample in the Acute Leukemia group (n=20)

TGF-β (pg/ml)	Timing of Sample	
	Induction	Maintenance
n	9	11
Min.–Max	1.91-42.70	1.49-45.18
Mean± SD	37.36±13.32	35.05±16.55
Median	42.09	42.09
95% CI of the median	40.66-42.39	39.73-44.17
25th Percentile – 75th Percentile	40.66-42.22	39.73-44.17
Test of significance	$Z_{(MW)}$=0.152	
p-value	p=.879	

Table 3: Comparison of serum TGF-β (pg/ml) of the Acute Leukemia group (n=20)

TGF-β (pg/ml)	Risk Stratification		
	Low Risk	Standard Risk	High Risk
- N	6	13	1
- Min. – Max	1.91-45.18	1.49-44.76	40.66-40.66
- Mean ± SD	35.63±16.59	35.96±15.23	40.66±0.00
- Median	41.90	42.09	40.66
- 95% CI of the median	40.50-42.39	40.22-42.70	40.66-40.66
- 25th Percentile – 75th Percentile	40.50-42.39	40.22-42.48	

CONCLUSIONS

- Although the current study did not demonstrate statistically significant results concerning serum TGF levels in children with Acute Leukemia, it is essential to recognize that other factors may influence these outcomes. The complex nature of TGF signalling and its interaction with various cellular pathways could account for the variability observed. An additional cause of the statistically insignificant results maybe due to the small sample size.