

# Assessment of Stress among Pediatric Patients with Acute Lymphoblastic Leukemia in Egypt

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## INTRODUCTION

Childhood cancer is a subject of growing concern worldwide, and especially in developing countries, due to increasing rate of incidence. Acute Lymphoblastic Leukemia (ALL) is the most abundant type of childhood cancer that is characterized by very good prognosis and high cure rates [1]. Yet, treatment procedures may show many adverse effects on physical and psychological health of pediatric patients that could extend after the complete cure.

As reported, ALL patients suffer from many stressors that affect their mental, physical and emotional state including physical changes like hair loss, pain, repeated hospitalization, weight gain and aggressive treatment procedures.

## OBJECTIVES

The present work is an observational study that aims to assess stress biochemically among a random sample of pediatric patients with ALL in Egypt and to identify some of the environmental and socio-demographic stress predictors.

## METHODOLOGY

The study was carried on pediatric patients treated at the National Cancer Institute (NCI) outpatient clinic and diagnosed with ALL after regular diagnosis procedures. Recruitment included pediatric patients with ALL undergoing maintenance phase treatment according to St. Jude ALL Total Therapy Study XV treatment protocol. Recruitment period lasted for three months through which 34 cases (26 males and 8 females) participated in the study.

A questionnaire was filled for all participants through interviewing that contained age at diagnosis, gender, residence, and some items related to treatment procedure; number of visits per month, admission period as inpatient per month and extent of compliance to treatment protocol.

Blood samples were taken (3mls) from study sample for biochemical assessment of cortisol (main stress biomarker) using ELISA kit purchased from AB Diagnostic Systems GmbH Germany.

Statistical analysis included descriptive data of study variables as mean and standard deviation for numeric values and frequency distribution for categorical data and Person correlation between cortisol and stress predictors. Student t test and/or ANOVA have also been done for comparing groups using SPSS ver.23.

## RESULT

Participant had mean age of 9.8 years ranging from 8 to 12 and mean age at the time of disease diagnosis was 6.7 years ranging between 3 and 10 years. Mean value for cortisol level ( $177 \pm 102$ nmol/l) in the study sample showed to be within normal level yet very near to the lower limit (138-690nmol/l). It showed to be significantly lower at  $p < 0.05$  in those with higher compliance ( $165 \pm 95$ nmol/l) compared to the less compliant ( $309 \pm 69$ nmol/l) and similarly in those hospitalized for more than half the treatment period compared to patients

who were hospitalized for less periods of time. Nearly similar low levels of cortisol were detected between other categories like male and female genders, patients with favorable and unfavorable prognosis and those living at urban and rural regions (Table 1). Cortisol lower levels also showed to be associated with other treatment conditions like more frequent visits to the outpatient clinic to follow up treatment, longer periods of hospitalization and increased compliance to treatment procedures that was represented by the Pearson correlation test yet non-significantly.

**Table 1. Descriptive data of study variables as frequency and percentage and mean values of cortisol level as compared between variables.**

Study Variables (N)	Frequency (%)	Cortisol Level (nmol/l) (mean±SD)	P Value
<b>Gender (34)</b>			
Male	26 (76.5%)	185±111	0.4
Female	8 (23.5%)	152±65	
<b>Age at diagnosis (32)</b>			
≤5	9 (28%)	147±111	0.4
>5	23 (72%)	178±90	
<b>Residence (34)</b>			
Urban	17 (50%)	170±87	0.7
Rural	17 (50%)	185±118	
<b>Prognosis (34)</b>			
unfavorable	4 (12%)	182±110	0.7
favorable	30 (88%)	165±80	
<b>Hospital visits/month (34)</b>			
once/month	26 (76.5%)	172±106	0.6
> once/month	8 (23.5%)	196±92	
<b>Hospital admission (34)</b>			
< half ttt period	2 (6%)	261±89	0.2
≥ half ttt period	32 (94%)	172±102	
<b>Compliance (34)</b>			
good	31(91%)	165±96*	0.02
poor	3 (9%)	309±67*	
<b>Cortisol level (nmol/l) (34)</b>			
within normal	20(59%)	177±102	-
below lower normal	14(41%)		

## CONCLUSION

It could be obviously concluded from the present work that childhood patients suffer from chronic stress due to treatment procedures. This could be clear from their low level of cortisol that goes in agreement with similar studies on pediatric ALL patients [2]. As reported, painful and aggressive treatments methods like injection, bone marrow transplantation and long treatment protocol are administered on ALL pediatric patients [3]. Moreover, chemotherapy itself has shown to cause adrenal suppression in children upon using it treatment and this effect could last over 9 days after tapering the dose [4].

## ACKNOWLEDGEMENT

The authors would like to express appreciation for the support of the sponsor; National Research Centre of Egypt [Project Number = 120801].

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