Measuring the prevalence of fatigue in children with cancer: Evidence from Egypt.

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Abstract

Background: Cancer related fatigue (CRF) is a common side effect of cancer and cancer treatment that impacts every aspect of quality of life. To our knowledge, the statistics for prevalence in pediatrics are lacking in Egypt. The aim of this study is to record the prevalence of fatigue and its significant predicting factors in pediatric oncology patients.

Methods: we interviewed children aged 8-18 years with cancer, prescribed chemotherapy and not in severe distress. After the consent of the guardian is taken, the children personally filled 2 fatigue-related questionnaires (PROMIS Pediatric Short Forms of Fatigue (PROMIS fatigue), pedsQL multidimensional fatigue (PedsQL fatigue)) and 3 symptoms related questionnaires.

Results: 42 children (47.6% female) (mean age 12.1 years (SD 3.3 years)) participated. Half of the children were in primary school (n=21, 50%) and most of them had their parents accompanying them (n=35, 83.3%). Most children suffered from a hematological tumor (n=35, 83.3%) and didn't suffer from other chronic health conditions (n=39, 92.8%). Reported moderate to severe fatigue in children is between half to third of the children depending on the measurement tool used. The mean T-score for PROMIS fatigue was 53.76 (SD 12.5), the mean score for PedsQL fatigue was 74.27 (SD 21.79). Stepwise standardized multivariant linear regression showed that fatigue following PROMIS fatigue could be predicted by depressive symptoms ($\boldsymbol{\beta}$= 0.47, p <0.001) and mobility ($\boldsymbol{\beta}$= -0.39, p =0.002) while following PedsQL fatigue, it could be predicted by upper extremity function ($\boldsymbol{\beta}$= 0.34, p= 0.005), depressive symptoms ($\boldsymbol{\beta}$=-0.49, p <0.001) and treatment status ($\boldsymbol{\beta}$=-0.25, p= 0.013).

Conclusion: CRF is multifactorial and prevalent among children and adolescents with cancer. Moreover, predicting factors differed between different tools as they measure fatigue from different dimensions. PedsQL fatigue was predicted by more factors. There is a need to include fatigue screening for pediatric oncology patients and incorporate its management in the medical care plan.

Key words: Fatigue- Oncology- Children- pedsQL multidimensional fatigue- PROMIS Pediatric Short Form of Fatigue v2 10a- Egypt.

Tables

Table 1 Sample Characteristics (N=42)

Characteristic	All participants N=42 N (%)	In-patients n=13 n (%)	Out-patients n=29 n (%)	*p* value
Age:				0.861
8-12 years	22 (52.4)	6 (46.2)	16 (55.2)	
13-18 years	20 (47.6)	7 (53.8)	13 (44.8)	
Mean (SD)	12.1 (3.3)	12.3 (3.4)	12.1 (3.3)	
Gender				0.514
Female	20 (47.6)	5 (38.5)	15 (51.7)	
BMI (Kg/m^2)				0.185
Underweight	4 (9.5)	3 (23.1)	1 (3.4)	
Normal weight	31 (73.8)	9 (69.2)	22 (75.9)	
Obese	6 (14.3)	1 (7.7)	5 (17.2)	
Overweight	1 (2.4)	0	1 (3.4)	
BSA (m^2)				0.414
Mean (SD)	1.27 (0.31)	1.21 (0.35)	1.30 (0.29)	
Province				0.832
North Upper Egypt	20 (47.6)	5 (38.5)	15 (51.7)	
Cairo province	14 (33.3)	5 (38.5)	9 (31)	
Canal province	4 (9.5)	1 (7.7)	3 (10.3)	
Other [A]	4 (9.5)	2 (15.4)	2 (6.9)	
Caregiver relationship				0.203
Parents	35 (83.3)	9 (69.2%)	26 (89.7%)	
Siblings	4 (9.5)	2 (15.4%)	2 (6.9%)	
Other [B]	3 (7.2)	2 (15.4%)	1 (3.4%)	
Education level				0.619
Primary school	21 (50)	6 (46.2)	15 (51.7)	
Preparatory school	8 (19)	2 (15.4)	6 (20.7)	
Secondary school	10 (23.8)	3 (23.1)	7 (24.1)	
Other [C]	3 (7.2)	2 (15.4)	1 (3.4)	

Characteristic	All participants N=42 N (%)	In-patients n=13 n (%)	Out-patients n=29 n (%)	*p* value
Type of cancer				0.005
Hematological tumors:				
ALL	26 (61.9)	4 (30.8)	22 (75.9)	
AML	7 (16.7)	5 (38.5)	2 (6.9)	
Lymphoma	2 (4.8)	1 (7.7)	1 (3.4)	
Solid tumors:				
Sarcoma	4 (9.5)	3 (23.1)	1 (3.4)	
Colon cancer	1 (2.4)	0	1 (3.4)	
Missing	2 (4.8)	0	2 (6.9)	
Other chronic health conditions				0.681
No other conditions	39 (92.8)	12 (92.3)	27 (93.1)	
Heart disease	2 (4.8)	1 (7.7)	1 (3.4)	
Diabetes	1 (2.4)	0	1 (3.4)	
Time since diagnosis				0.0038
Less than 6 months	17 (40.5)	10 (76.9)	7 (24.1)	
6-12 months	12 (28.5)	2 (15.4)	10 (34.5)	
Over 12 months	13 (30.5)	1 (7.7)	12 (41.3)	
Type of treatment				0.004
Total 15 protocol	27 (64.3)	4 (30.8)	23 (79.3)	
AML protocol	7 (16.7)	5 (38.5)	2 (6.9)	
t-10 protocol	2 (4.8)	2 (15.4)	0	
other [D]	5 (12)	2 (15.4)	3 (10.3)	
Missing	1 (2.4)	0	1 (3.4)	
Current treatment status				0.007
Active chemotherapy treatment	36 (85.7)	9 (69.2)	27 (93.1)	
Between cycles of chemotherapy	4 (9.5)	4 (30.8)	0	
Finished treatment	1 (2.4)	0	1 (3.4)	
Didn’t start treatment yet	1 (2.4)	0	1 (3.4)	
Number of cycles received				0.078
Over 8 cycles				

Characteristic	All participants N=42 N (%)	In-patients n=13 n (%)	Out-patients n=29 n (%)	*p* value
3-4 cycles	31 (73.8)	7 (53.8)	24 (82.7)	
1-2 cycles	4 (9.5)	3 (23.1)	1 (3.4)	
Didn't receive chemotherapy	6 (14.3)	3 (23.1)	3 (10.3)	
	1 (2.4)	0	1 (3.4)	
Hemoglobin (g/dl)				0.009
Mean (SD)	11.03 (1.86)	10.07 (1.59)	11.46 (1.84)	
Total leukocytic count (10^3 cell/ml)				0.149
Mean (SD)	4.17 (3.89)	3.12 (1.86)	4.65 (4.47)	
PROMIS upper extremity				0.280
Mean (SD)	37.04 (4.98)	36.46 (5.12)	37.31 (4.98)	
PROMIS mobility				0.026
Mean (SD)	32.02 (8.89)	26.92 (10.3)	34.31 (7.26)	
PROMIS depressive symptoms				0.974
Mean (SD)	15.38 (7.80)	16.07 (7.72)	15.06 (7.95)	

[A] Other provinces: Alexandria province, South upper Egypt, Delta province and Outside Egypt.

[B] Other caregiver relationship: grandparents and uncle/ aunt.

[C] Other education level: uneducated and commercial secondary school.

[D] Other types of treatment: ICE (ifosfamide, carboplatin, and etoposide phosphate), VAC (Vincristine, actinomycin D and cyclophosphamide), COPDAC protocol (cyclophosphamide, vincristine sulfate, prednisone and dacarbazine), FOLFOX (leucovorin calcium (folinic acid), fluorouracil, and oxaliplatin), LMB protocol (Vincristine, cyclophosphamide, methotrexate, Adriamycin).

ALL: acute lymphoblastic leukemia. AML: acute myeloid leukemia., BSA: body surface area (Mosteller formula), BMI: body mass index.

Table 2: Summary of Scores of Fatigue Questionnaires and their matching status:

Patient Serial number	PROMIS Score	Interpretation PROMIS	pedsQL Score	Interpretation PedsQL	Status
P20243	56	mild	88.9	mild	
Q20244	42	normal	94.4	normal	
P20255	44	normal	94.4	normal	
Q20256	45	normal	95.6	normal	

P2112	34	normal	100	normal	
P2171	42	normal	91.7	normal	
Q2176	77	severe	27.9	severe	Matched (33.3%)
Q2183	45	normal	100	normal	
P21141	45	normal	97.2	normal	
Q21142	39	normal	97.2	normal	
Q21211	34	normal	94.4	normal	
P21212	45	normal	100	normal	
Q2252	59	moderate	56.9	moderate	
P2253	55	moderate	41.7	moderate	
P20241	48	normal	54.2	Moderate	
Q20242	75	severe	50	Moderate	
P20251	68	severe	36.1	moderate	
Q20252	68	severe	58.3	moderate	
P20253	61	moderate	87.5	mild	
Q20254	61	moderate	66.7	mild	
P20257	48	normal	86.1	mild	
Q20258	45	normal	62.5	mild	
P20259	63	moderate	69.4	mild	
Q202510	68	severe	59.7	moderate	
Q20312	82	severe	33.3	moderate	
P20313	66	moderate	25	severe	
Q2111	50	normal	86.1	mild	
Q2113	34	normal	88.9	mild	Unmatched (66.7%)
Q2172	58	moderate	88.9	mild	
P2173	45	normal	72.2	mild	
Q2174	34	normal	86.1	mild	
P2175	62	moderate	72.2	mild	
P2177	58	moderate	62.5	mild	
Q2181	57	mild	52.8	moderate	
P2182	66	moderate	62.5	Mild	

P21151	39	normal	87.5	Mild
Q21152	47	normal	76.4	mild
P21153	70	severe	52.8	moderate
Q21221	66	moderate	93.1	normal
P2251	51	normal	83.3	mild
Q2261	50	mild	91.7	normal
P2262	56	moderate	93.1	normal

Table 3: correlation between fatigue score and measured patients' characteristics

	All participants				**In- patients**				**Out-patients**			
	PROMIS fatigue		**PedsQL fatigue**		**PROMIS fatigue**		**PedsQL fatigue**		**PROMIS fatigue**		**PedsQL fatigue**	
	r	**p value**	**r**	**p value**	**r**	**p value**	**r**	**p value**	**r**	**p value**	**r**	**p value**
Age	0.157	0.318	-0.227	0.148	0.342	0.252	-0.153	0.616	0.167	0.384	-0.285	0.133
Gender	0.029	0.852	0.001	0.990	0.170	0.577	-0.169	0.581	-0.182	0.343	0.078	0.685
BMI	0.124	0.432	-0.202	0.197	0.306	0.308	-0.346	0.245	0.072	0.708	-0.163	0.396
BSA	**0.297**	**0.056[b]**	**-0.360**	**0.019[b]**	0.341	0.254	-0.274	0.363	**0.379**	**0.042[b]**	**-0.428**	**0.021[b]**
Province	0.178	0.259	0.081	0.607	0.379	0.201	-0.189	0.535	0.075	0.698	0.254	0.182
Caregiver relationship	-0.027	0.862	0.043	0.782	0.169	0.579	-0.003	0.991	-0.178	0.354	0.107	0.578
Education level	0.252	0.107	**-0.272**	**0.081[A]**	0.299	0.319	-0.090	0.768	0.296	0.118	**-0.376**	**0.04[b]**
Cancer type	0.142	0.369	-0.054	0.733	0.417	0.155	-0.201	0.508	0.028	0.883	0.051	0.702
Other chronic health conditions	0.198	0.208	-0.087	0.582	-0.077	0.801	0	1	0.298	0.116	-0.131	0.498

	All participants				In- patients				Out-patients			
	PROMIS fatigue		**PedsQL fatigue**		**PROMIS fatigue**		**PedsQL fatigue**		**PROMIS fatigue**		**PedsQL fatigue**	
	r	**p value**	**r**	**p value**	**r**	**p value**	**r**	**p value**	**r**	**p value**	**r**	**p value**
Time since diagnosis	-0.074	0.641	-0.058	0.714	**0.608**	**0.027[b]**	**-0.514**	**0.072[A]**	-0.270	0.155	0.074	0.702
Type of treatment	0.198	0.206	-0.052	0.739	0.319	0.287	-0.178	0.559	0.129	0.504	0.062	0.747
Current treatment status	0.056	0.724	**-0.275**	**0.077[A]**	0.247	0.415	-0.356	0.232	-0.077	0.691	-0.231	0.228
Number of chemotherapy cycles	0.045	0.773	0.074	0.639	- .413	0.159	0.171	0.575	0.177	0.356	0.054	0.779
Hemoglobin	0.128	0.418	-0.044	0.777	-0.168	0.583	0.331	0.269	**0.321**	**0.089[A]**	-0.181	0.345
Total leucocytic count	-0.126	0.426	0.164	0.296	-0.427	0.145	**0.605**	**0.028[b]**	0.024	0.899	-0.042	0.826
PROMIS upper extremity	**-0.545**	**<0.001[b]**	**0.524**	**<0.001[b]**	-0.440	0.132	**0.611**	**0.026[b]**	**-0.551**	**<0.001[b]**	**0.496**	**<0.001[b]**
PROMIS mobility	**-0.702**	**<0.001[b]**	**0.667**	**<0.001[b]**	**-0.752**	**<0.001[b]**	**0.654**	**0.015[b]**	**-0.620**	**<0.001[b]**	**0.659**	**<0.001[b]**
PROMIS depressive symptoms	**0.669**	**<0.001[b]**	**-0.597**	**<0.001[b]**	**0.688**	**<0.001[b]**	**-0.730**	**<0.001[b]**	**0.672**	**<0.001[b]**	**-0.484**	**<0.001[b]**

[A] Significant at 0.1 level (two-tailed).
[b] Significant at 0.05 level (two-tailed).
Bold numbers are significant correlations

Table 4: results of multiple linear regression predicting PedsQL fatigue scores:

	coeff	*std err*	*t stat*	*p-value*	*lower*	*upper*	*vif*
Intercept	40.393	24.505	1.648	0.108	-9.354	90.141	
upper extremity	1.059	0.527	2.010	0.052	-0.010	2.129	1.762
Mobility	0.736	0.361	2.037	0.049	0.002	1.470	2.642
depressive symptoms	-1.120	0.326	-3.430	0.001	-1.784	-0.457	1.662
BSA	-2.615	8.007	-0.326	0.745	-18.87	13.64	1.596
health status	-8.693	5.438	-1.598	0.118	-19.73	2.346	1.654
treatment status	-16.68	6.011	-2.775	0.008	-28.88	-4.479	1.158

Table 5: Results of multiple linear regression predicting PROMIS SF fatigue scores:

	coeff	*std err*	*t stat*	*p-value*	*lower*	*upper*	*vif*
Intercept	81.59	16.20	5.036	1.44E-05	48.71	114.4	
upper extremity	-0.361	0.348	-1.037	0.306	-1.068	0.345	1.762
mobility	-0.678	0.238	-2.837	0.007	-1.163	-0.193	2.642
depressive symptoms	0.626	0.216	2.900	0.006	0.1880	1.065	1.662
BSA	-4.991	5.293	-0.942	0.352	-15.73	5.755	1.596
health status	5.204	3.595	1.447	0.156	-2.094	12.50	1.654
treatment status	2.819	3.974	0.709	0.482	-5.249	10.88	1.158