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Growth Hormone Level in Cystic Fibrosis Children

EMAN M. FOUDA, M.D.; RANA A.A. MAHMOUD, M.D.; HAYA E.I. AHMED, M.D.; ESLAM S.A. MOHAMED, M.Sc. and HEBA ALLAH A. ALI, M.D.

The Department of Paediatrics, Faculty of Medicine, Ain Shams University

Abstract

Background: Cystic fibrosis (CF) is a complex and systemic disorder which is caused by mutations in the cystic fibrosis transmembrane conductance regulator (CFTR) gene. The absence of CFTR and the cAMP-regulated anion channel results in the manifestation of disease, such as failure to thrive and malnutrition.

Aim of Study: This study aimed to asses growth hormone levels in CF children.

Patients and Methods: This is a case-control study was conducted on 20 cystic fibrosis patients who were compared to 20 apparently healthy control participants.

Results: There were no significant differences between patients with normal and low growth hormone levels as regard presenting symptoms or signs.

Conclusion: The current results: Growth hormone might decrease in cystic fibrosis children.

Key Words: *Cystic Fibrosis – Growth Hormone.*

Introduction

CYSTIC fibrosis is multisystem disorder caused by mutations in the gene for the CF trans membrane conductance protein (CFTR) **[1].**

Like most chronic inflammatory disease in childhood, CF is associated with impaired growth **[2]**. The exact mechanisms of this effect are not known, although it is generally thought to be caused by concomitant severe disease complications due to the inflammation itself, as well as prolonged use of steroids and suboptimal nutrition. Moreover, an important correlation has been found between poor growth, and reduced long-term lung function in children with CF **[3].**

Correspondence to: Dr. Eslam S.A. Mohamed,
E-Mail: alihanasoso@gmail.com

Patients and Methods

The material of this Case-control study comprised 40 patients who were recruited from chest clinics, Children Hospital, Ain Shams University over 1 year from September 2022 to September 2023.

Patients who were diagnosed as cystic fibrosis cases with Tanner stage 1 were included in the study. Diagnosis of cystic fibrosis was done based on 2 positive sweat chloride test or paired CFTR DNA genetic mutation.

While patients were excluded from the study: Drugs or medications taken within the previous six months.

After application of inclusion and exclusion criteria, the study included 40 participants; 20 patients who were diagnosed as CF and 20 healthy participants as controls.

The collected data was used for research purposes only. Written informed consent was signed by all participants. Study protocol was presented to and approved by the ethical committee of the scientific research Faculty of Medicine, Ain Shams University.

Statistical analysis:

All data were tabulated in SPSS sheet version 27. Categorical data were expressed as number and percent. Continuous data were expressed as mean and standard deviation if normally distributed or median and interquartile ranges if abnormally distributed. Appropriate test was used according to data type. A *p*-value less than 0.05 is considered statistically significance.

Results

The previous table shows that there was no statistically significant difference found between patients group and control group regarding sociodemographic data with *p*-value = 0.108 and 1.001; respectively.

The previous table shows that there was no statistically significant difference found between patients with normal and low growth hormone level regarding symptoms and signs.

The previous table shows that there was no statistically significant difference found between patients with normal and low growth hormone level regarding radiological findings in the last year.

Table (1): Sociodemographic characteristics among studied patients and controls.

Personal history	Patients group No.=20	Control group No.=20	Test-value	*p*-value	Sig.
Age of patient (years):					
Median (IQR)	4.93 (1.74 – 9.0)	4.93 (1.74 – 9.34)	1.700‡	0.108	NS
Range	0.93 – 14.93	0.93 – 16			
Sex:					
Male	12 (46.1%)	12 (46.10%)	0.001*	1.001	NS
Female	8 (43.9%)	8 (43.90%)			
Residence:					
Rural	12 (46.1%)	12 (68.30%)	1.287*	0.234	NS
Urban	8 (43.9%)	8 (31.70%)			
Paternal consanguinity:					
No	7 (34.1%)	7 (43.90%)	0.720*	0.385	NS
Yes	13 (64.9%)	13 (46.20%)			

‡: Mann-Whitney test. *: Chi-square test.

Table (2): Comparison between patients with normal and low growth hormone level regarding history of present illness.

	Growth hormone level (Normal or Low)		Test-value	*p*-value	Sig.
	Normal No.=12	Low No.=8			
History of present illness:					
Symptoms:					
Cough:					
No	1 (3.7%)	0 (0%)	0.591*	0.442	NS
Yes	11 (96.3%)	8 (100%)			
Dyspnea:					
No	7 (51.9%)	1 (14.3%)	1.518*	0.218	NS
Yes	5 (48.1%)	7 (85.7%)			
Exercise intolerance:					
No	8 (66.7%)	2 (28.6%)	1.775*	0.183	NS
Yes	4 (33.3%)	6 (71.4%)			
Failure to gain weight:					
No	5 (18.5%)	1 (7.1%)	0.032*	0.858	NS
Yes	7 (81.5%)	7 (92.9%)			
Signs					
Cyanosis-A:					
No	9 (92.6%)	7 (92.9%)	0.015*	0.903	NS
Yes	3 (7.4%)	1 (7.1%)			

*: Chi-square test.

Table (3): Comparison between patients with normal and low growth hormone level regarding radiological findings in the last year.

	Growth hormone level (Normal or Low)		Test-value	*p*-value	Sig.
	Normal No.=12	Low No.=8			
Radiological findings in the last year					
X-ray chest findings:					
Normal	2 (3.7%)	0 (0%)	2.503*	0.644	NS
Increase bronchovascular Marking	8 (81.5%)	6 (85.7%)			
Less bronchovascular marking	1 (3.7%)	0 (0%)			
Consolidation Patches	1 (3.7%)	1 (7.1%)			
Complete opacification and diminished volume	0 (0%)	1 (7.1%)			
Computed tomography of the chest findings:					
Normal finding	1 (8.3%)	0 (0%)	11.193*	0.191	NS
Bilateral bronchiectatic changes	1 (8.3%)	6 (71.4%)			
Bilateral mucus plugging	5 (50.0%)	1 (7.1%)			
Right lower lobe consolidation collapse	1 (8.3%)	0 (0%)			
Bilateral posterior basal subsegmental consolodiation patches	1 (8.3%)	1 (7.1%)			
Few small nodular density in the right lung	1 (8.3%)	0 (0%)			
Total collapse of left lung	0 (0%)	0 (0%)			
Bilateral atlectatic band	1 (8.3%)	0 (0%)			
Mild diffuse emphysematous lung changes	1 (8.3%)	0 (0%)			

*: Chi-square test. •: Independent *t*-test. ‡: Mann Whitney test.

Discussion

The aim of the present study was to evaluate growth hormone levels among CF patients. To achieve this aim, 20 CF patients were included in the study and were compared to 20 apparently healthy controls.

The study included 20 cystic fibrosis patients with median age 5.92 years which was compared to 20 age and sex matched apparently healthy control group. In consistence with the present study, El-Koofy et al., *[4]* included 50 Egyptian CF patients and reported mean age 4.6±3 years.

Most of cystic fibrosis patients in the present study were males (46.1%). This came in agreement with a previous demographic study on Middle East patients which demonstrated that 60% of Arab CF patients were males *[5]*. Similarly, El-Koofy et al., *[4]*.

On the other hand, Xu et al., *[5]* found that 75% of CF patients were female.

Most of patients in the present study came from rural areas (46.1%) with no statistically significant differences when compared to control group. In concordance with the present study, Jessup et al., *[6]* showed that CF was higher among rural areas in Australia. On the other hand, El-Falaki et al., *[7]* in previous Egyptian study, 61.1% of patients came from urban areas.

Paternal consanguinity was reported in 64.9% of patients in the present study. In concordance with the present results, El- Falaki et al., *[7]* in previous Egyptian studies showed that 53%, 46% of CF patients had positive consanguinity. On contrary, Liu et al., *[8]* found that All patients denied consanguineous marriage in their families.

In the present study, the main CT findings were bilateral bronchiectasis changes (71.4%) and mucus plugging (50%). In agreement with the present study, in Xu et al., *[6]*, Chest computed tomography of CF patients showed bronchiectasis in older children and air trapping in infant cases.

Conclusion:

The current results: Growth hormone might decrease among cystic fibrosis children.

References

1- FARRELL P.M., WHITE T.B., REN C.L., HEMPSTEAD S.E., ACCURSO F., DERICHS N., HOWENSTINE M., MCCOLLEY S.A., ROCK M., ROSENFELD M. and SERMET-GAUDELUS, et al.: Diagnosis of cystic fibrosis:

consensus guidelines from the Cystic Fibrosis Foundation. The Journal of Pediatrics, 181: pp. S4-S15, 2017.

2- PAGANI S., BOZZOLA E., STRISCIUGLIO C., MEAZZA C., MIELE E., MALAMISURA M., DE ANGELIS P., BOZZOLA M., et al.: Growth Hormone Receptor Gene Expression Increase Reflects Nutritional Status Improvement in Patients Affected by Crohn's Disease. Frontiers in Pediatrics, 6: p. 338, 2018.

3- STALVEY M.S., PACE J., NIKNIAN M., HIGGINS M.N., TARN V., DAVIS J., HELTSHE S.L., ROWE S.M., et al.: Growth in prepubertal children with cystic fibrosis treated with ivacaftor. Pediatrics, 139 (2): p. e20162522, 2017.

4- EL-KOOFY N., EL-MAHDY M., FATHY M., EL FALAKI M. and HAMED D.H.E.D.: Nutritional rehabilitation for children with cystic fibrosis: Single center study. Clinical nutrition ESPEN, 35: 201-206, 2020.

5- XU C., TANG Y., DONG L. and SHEN Y.: Clinical and genetic characteristics of children with cystic fibrosis in Henan China: A single-center retrospective analysis. Pediatric Pulmonology, 58 (10): 2865-2870, 2023.

6- JESSUP M.M., SHIELDS L., DOUGLAS T., SMYTH W., ABERNETHY G. and PRIDDIS L.: 269 Living with cystic fibrosis in a remote or rural area. Journal of Cystic Fibrosis, 14: S127, 2015.

7- EL-FALAKI M.M., SHAHIN W.A., EL-BASHA N.R., ALI A.A., MEHANEY D.A., et al.: Profile of cystic fibrosis in a single referral center in Egypt. Journal of Advanced Research, 5 (5): 563-568, 2014.

8- LIU K., XU W., XIAO M., ZHAO X., BIAN C., ZHANG Q., et al.: Characterization of clinical and genetic spectrum of Chinese patients with cystic fibrosis. Orphanet journal of Rare Diseases, 15 (1): 1-10, 2020.

نقص هرمون النمو فى التليف الكيسى فى الأطفال

المقدمة: هرمون النمو البشريهو هرمون بروتينى تفرزه الغدة النخامية، والذى يعمل من خلال الارتباط بمستقبلات هرمون النمو. وهو يعمل إما عن طريق إحداث تأثيرات مباشرة أو البدء فى إنتاج عامل النمو الشبيه بالأنسولين–١، وهو الوسيط الرئيسى لتأثيرات هرمون النمو.

الهدف من العمل: هو تقييم مستويات هرمون النمو لدى أطفال التليف الكيسى.

المرضى وطرق البحث: أجريت دراسة الحالات والشواهد هذه على ٤١ مريضًا بالتليف الكيسي وتمت مقارنتهم بـ ٤١ مشاركًا يتمتعون بصحة جيدة. أجريت الدراسة على مرحلتين. فى المرحلة الأولى، تم إجراء إعادة التأهيل الغذائى لجميع المشاركين باستخدام تركيبات عالية السعرات الحرارية والفيتامينات وبدائل إنزيم البنكرياس لمدة ستة أشهر. وشملت المرحلة الثانية أولئك الذين لديهم نمو غير مثالى، ثم خضعوا لمزيد من التقييم المختبرى والتصويرى. تم تقييم عامل النمو الشبيه بالأنسولين ١ وهرمون النمو فى كل من مجموعتى الدراسة والمجموعة الضابطة.

النتائج: لم تكن هناك فروق ذات دلالة إحصائية بين المرضى الذين يعانون من مستويات هرمون النمو الطبيعية والمنخفضة فيما يتعلق بإظهار الأعراض أو العلامات، واختبارات وظائف الرئة، والنتائج الإشعاعية، ونتائج زراعة البلغم والنتائج المختبرية. ارتبطت مستويات هرمون النمو عكسيًا بالتواتر وأيام دخول المستشفى وعدد زيارات الطوارئ.

الخلاصة: تؤكد النتائج الحالية انخفاض هرمون النمو لدى أطفال التليف الكيسى.