Journal Homepage: -www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/12220
DOI URL: http://dx.doi.org/10.21474/IJAR01/12220

RESEARCH ARTICLE

CHILDREN ON HEMODIALYSIS: A RETROSPECTIVE STUDY IN BENGHAZI PEDIATRIC HOSPITAL

Narges M. Kablan, Khadija A. Ali, Kamlah J. Said, Mabroka A. Ali, Aisha H. Saleh, Wafa M. Almajbri and Salma A. Bukhatwa
Department of Pharmacology and Toxicology, Faculty of Pharmacy/University of Benghazi, Benghazi, Libya.

Manuscript Info

Manuscript History
Received: 25 October 2020
Final Accepted: 28 November 2020
Published: December 2020

Key words:-
End Stage Renal Disease, Hematological Profile, Hemodialysis, Pediatric, Libya

Abstract

End stage renal disease (ESRD) is a major health problem worldwide. In Libya, limited studies are available on children with ESRD.Regular assessment of laboratory parameters is the only way to reduce their risk of mortality.This study aimed to determinethe demographic characteristics and evaluate the hematological profile of children on hemodialysis (HD) admitted to the dialysis unit in Benghazi Pediatric hospital, Benghazi, Libya during the period 3rd of December, 2017 to 15th of January 2018.A structured form was used to record data collected from patients' files. Data includedage, gender, body weight, treatment history, drug history, duration and frequency of HD and laboratory tests' results, specifically white blood cells (WBC), hemoglobin (HB), blood urea, glucose, Albumin, uric acid, serum creatinine, serum iron, calcium, phosphate, sodium and potassium**.**Number of patients on HD includedin this study was seven with average age of 11years,the majority (71%)were males.Average body weight of female patients was24.2kg,while male patients averagebody weight was25.52kg. Most of the patients(57%)hadhigh BP.71%of patientsstarted dialysis sincemore than one year.Patients underwentdialysisthree times a week represented(86%),while the rest of patients underwent dialysis four times a weekrepresented(14%).All patients had anemia and highcreatininelevel.Providing an appropriate care for children on maintenance dialysis in Libya is quitedifficult. Increasing the awareness ofparents about ESRD is necessary to improve the life quality of children with ESRD.

Introduction:-

Chronic kidney disease (CKD) is a condition related to irreversible kidney damage and it may progress to end stage renal disease (ESRD)(Harambat et al.,2012). CKD is a major health problem worldwide with serious humanitarian and economic implications (Akkari, 2013), (Goleg et al., 2014). ESRD is the terminal stage of chronic kidney disease and is an important cause of mortality and cardiovascular morbidity in children(Greenbaum et al., 2009),(Shroff and Ledermann, 2009), (Rees, 2009).There are different therapies for ESRD, successful renal transplantation is the preferred therapy, howevere, maintenance dialysis is important for medically suitable patients(Mehrotra, 2005).Peritoneal dialysis (PD) and hemodialysis (HD) are dialysis options for ESRD patients in whom preemptive kidney transplantation is not possible(Sinnakirouchenan and Holley, 2011).Peritonial dialysis

Corresponding Author:- Narges M. Kablan
Address**:-** Department of Pharmacology and Toxicology, Faculty of Pharmacy/University of Benghazi, Benghazi, Libya.

(PD) is preferred in young children with ESRD and acute kidney injury (AKI)because it is simple and safe and offersa gradual rate of fluid removal and correction of metabolic imbalances(Sethi et al., 2014). Hemodialysis (HD) is used when rapid removal of toxins is required or in situations when PD cannot be carried out for various reasons. In children with AKI, there has been increase application of continuous renal replacement therapy (CRRT) specifically continuous hemodiafiltration(Goldstein, 2009). In addition, HD can be applied in children with less sever AKI (Harambat et al.,2012),(Akkari,2014).

In Libya, ESRD is a major health problem. The reported incidence of ESRD is 80–100 per million per year, and there are approximately 2100 patients currently on dialysis(Elamouri andElkout, 2017),(Arora et al., 2013),(Sauod andAklifa,2017).Maintenance dialysis therapy is funded by public health care sector(Salma et al., 2016). Unfortunalty, there is no national renal registry(Alashek et al., 2011).Limited studeisare available on children with ESRD in Libya. Here in this study wedeterminedthe demographic characteristics and evaluated the hematological profile of all children on hemodialysis (HD) admitted to the dialysis unit in Benghazi Pediatric hospital which is the only dialysis unit in the eastern part of Libya during the period 3rd of December, 2017 to 15th of January 2018.

Aim:
The aim of this study is todeterminethe demographic characteristics andevaluatethe hematological profile of children on hemodialysis (HD) in Benghazi Pediatric hospital, Benghazi, Libya.

Materials and Methods:-

This is a retrospective study that included all children with age less than 18 years old diagnosed withkidney problem and underwent HD fromDecember,3, 2017 to January,15, 2018 in BenghaziPediatric hospital.

The total number of patients included in this study was seven. The data collected from the medical records of the seven patients included both demographic data and the laboratory tests results (white blood cells (WBC),hemoglobin (Hb), blood urea, glucose, Albumin, uric acid, serum creatinine, serum iron, calcium, phosphate, sodium and potassium). Any medical records that did not have the relevant data were excluded. The demographic data consisted of the age, gender and body weight.The treatment history, drug history, duration and frequency of HD were noted.The blood pressure as recorded in the case sheet and the presence of any chronic disease were noted as well.

Statistical Package for the social Science (SPSS) version 15.00 software package (SPSS Inc, Chicago, IL, USA) was used for the analysis of results.

Results:-

Atotal of seven patients were included in this study. This included five males with an average age of 12 years old and two females with an average age of 10 years old. The male average body weightwas 25.52 kg and female average body weight was 24.2 kg.The majority of patientsstarted dialysis since more than one year (71%) (n=5) while the rest of patients (29%) (n=2) started dialysis since less than one year. (Table1). The frequency of dialysis was three times a week in the most of the patients 86% (n=6) and four timesa week in the rest of patients 14%(n=1). The majority of patients had high BP and they represented57% of study sample.Regarding laboratory test results, all patients had high creatinine level and anemia. The mean valuefor creatinine was(9.1 mg/dL) which is higher than the reference range for those patients (0.3-1.0 mg/L), and themeanhemoglobin level was (8.4 dL) which is lower than the reference range (11.2-16.5 g/dL).

Table 1:- Demographic characteristics and Hematological profile of pediatric patients on hemodialysis.

Characteristic	**n (%) or average**
Gender: Male Female	 5 (71%) 2 (29%)
Average age (y): Male Female	 12 10
Average body weight (kg): Male Female	 25.52 24.3

Duration of dialysis:	
Less than 1 year	2(29%)
More than 1 year	5(71%)
Frequency of dialysis:	
3 times a week	6(86%)
4 times a week	1(14%)
Blood pressure:	
High blood pressure	4(57%)
Normal blood pressure	3(43%)
Hematological profile:	
WBC,µ/L	6.4*10^3
Hb, dL	8.4
Iron, mg/dL	64.5
Glucose, mg/dL	102.9
Phosphate, mg/dL	6.8
Calcuim, mmol/dL	9.1
Soduim, mmol/L	108.8
Creatinine, mg/L	9.1
Urea, mmol/L	140.4
Albumin, g/L	3.6
Uric acid, mg/dL	6.3
Potassium, mmol/L	5.1

Discussion:-

Study was conducted in BenghaziPediatric hospital,all HD patients'cases admitted to the dialysis units in this hospital during the periodfrom December,3,2017 to January,15,2018were included in this study.

In children with kidney failure, the age of onset varies according to geography and nationality(Youssef andNeemat, 2013).Our study shows that patientswith renal disease had average ageof 11 years,the youngest child was seven years old and started dialysis at the age of two.Astudy in Egypt reported that age of onset of dialysis inpatients was (5.6 year)(Youssef andNeemat, 2013). Another study in Turkey reported that the mean age of children was 9.5 years (Gruskin et al., 1992), however, the age of onset in India was different. One studyshowed that the median age of patients was 13 years and only 6.25% of patients were under 5 years of age(Şirin et al., 1995),while another study showed that 33% of patients were under 5 years of age(Srivastava,1987).

The majority of the patients were males(71%) which is consistent with other studies in Benghazi in which the males represent the majority of ESRD patients on dialysis. This could be due to the higher occurrence of obstructive uropathyamong men caused by the presence of congenital posteriorurethral valve(Sauod and Aklifa, 2017),(Zaied et al., 2003).

The duration of dialysis varies among patients. 28 % of patients (n=2) started dialysis in less than one year,while71% of patients (n=5)started dialysis in more than 1 year. A study by Suri et al. showed that prolonged dialysis prior to renal transplantation is associated with the poorsurvival of renal transplants (Suri et al., 2006), another study reported that the risk of death increased with increases in the duration of dialysis, especially in diabetic patients(Iseki et al., 2003).

Astudy in children receiving renal transplant showed that minimizing the use and the duration ofpretransplant HD could decrease risk of graft rejection from living donors(Butani and Perez, 2011).There could be a need for further studies to explore the reasons behind such results.

Patientsunderwent dialysis three times a week represented86% (n=6) of study sampleand onlyone patients underwent dialysis four times a week.Based on observational and controlled nonrandomized studies,it was suggested that more frequent and/or longer dialysis improves the patient's quality of life, controls hyperphosphatemia and reduces hypertension(Iseki et al., 2003),(Butani and Perez, 2001),(Lindsay, 2004).

In regards to laboratory tests results, all patients had high creatinine level and anemia. Anemia is a well-knowncomplication of CKD in children and the prevalence of anemia increases with increasing CKD stage(KDOQI Clinical Practice Guideline and Clinical Practice Recommendations for anemia in chronic kidney disease. Am J Kidney Dis. 2007) and it is mostly due to decreased production of erythropoietin and iron deficiency(Staples et al., 2009),(Chandra et al., 1988).Anemia could alsooccur in CKD due toblood loss, shortened red cell life span, vitamin deficiencies, "uremic milieu," and inflammation (Анемії К, 2012).
Correction of anemia with erythropoietin has been associated with a variety of beneficial effects in children (Nurko, 2006),(Chandra et al., 1988),(Burke, 1995).Patients therefore are given EPREX and folic acid (Table 2).

Table 2:- Drug treatment for pediatric patients on hemodialysis.

Patient	**Drugs**
Patient1	Folic acid, EPREX,One alpha, Ranagel, Cozaar.
Patient2	Folic acid, EPREX, One alpha , Ranagel
Patient3	Folic acid, EPREX, One alpha ,Ranagel
Patient4	Folic acid, EPREX, One alpha ,Ranagel, Cozaar
Patient5	Folic acid, EPREX, One alpha , Ranagel, Cozaar
Patient6	Folic acid, EPREX, One alpha, Ranagel
Patient7	Folic acid, EPREX, One alpha, Ranagel

In 2013, KDIGO published the recommendation about the optimal target for the treatment of anemia in CKD patients,starting witha large dose of EPREX (200-300IU/Kg/Week)followed with a lower dose (100-150 IU/ Kg/Week) and with different doses of folic acid and multivitamins(Анемії, 2012).Also, we found in this study that patients need a nutritionist follow up. Unfortunately, nutritionists followed the patients only once at the start of the dialysis. Regarding the growth hormones, there was neither follow up to growth hormone nor therapy given to children.

Conclusion:-

In the last two decades, there has been a majorimprovement in modalities of renal replacement therapy which provided a better life quality for children on maintenance dialysis, however, providing an appropriate care for such children is difficult in Libya due to many reasons including: high cost ofmedication, the lack of government financial support, the prohibited renal transplantations due to the poor logistics and law restrictions as well as the lack of social support and theunawarenessof the patientsfamilies about ESRDand dialysis.

Regular assessment of laboratory parameter is the only way to reduce the risk of mortality in children with ESRD. Growth hormone should be assessed and children should be given recombinant growth hormoneagent as a therapy depending on the stage ofdisease**.** Monitoring calcium, phosphorus and potassium is important. Children should be also followed up by a nutritionist.

Increasing the awareness of parents and educating them about ESRD to improvethe life quality of their children is necessary, sometimes it is hard for the child and his parent to accept the disease, therefore, the support of a psychiatrist is important.

Limitations of this study:

The small number of patients included in the study is one of the limitations. Another limitation is that the effect of the number of dialysis session, drugs and diet were not analyzed statistically.

Acknowledgment:-

The authors are grateful for all the doctors and nurses in the dialysis unit at Benghazi Pediatric Hospital for their time and cooperation during recruitment and conduct of the study.

References:-

1. Akkari, K. B. E. (2013): Projecting Requirements for End Stage Renal Disease Services in Libya 2014-2024. Ibnosina J Med Biomed Sci, 5(6).

2. Arora, P., Vasa, P., Brenner, D., Iglar, K., McFarlane, P., Morrison, H., and Badawi, A. (2013): Prevalence estimates of chronic kidney disease in Canada: results of a nationally representative survey. Cmaj, 185(9), E417-E423.
3. Alashek, W. A., McIntyre, C. W., and Taal, M. W. (2011): Provision and quality of dialysis services in Libya. Hemodial Int. 15(4), 444-452
4. Анемії, К. (2012): KDIGO clinical practice guideline for anemia in chronic kidney disease. Kidney Int, 2, 279.
5. Burke, J. R. (1995): Low-dose subcutaneous recombinant erythropoietin in children with chronic renal failure. PediatrNephrol, 9(5), 558-561.
6. Butani, L., and Perez, R. V. (2011): Effect of pretransplant dialysis modality and duration on long-term outcomes of children receiving renal transplants. Transplantation, 91(4), 447-451.
7. Chandra, M., Clemons, G. K., and McVicar, M. I. (1988): Relation of serum erythropoietin levels to renal excretory function: evidence for lowered set point for erythropoietin production in chronic renal failure. J Pediatr, 113(6), 1015-1021.
8. Elamouri J, Elkout H. Chronic Kidney Disease Associated Anemia among Adults in Libya: An Epidemiological Pattern. Proceedings of the Second Medical Conference of Community Medicine.Faculty of Medicine, Tripoli University; 2017. p. 107.14
9. Goldstein, S. L. (2009, March): THE CLINICAL APPLICATION OF CRRT—CURRENT STATUS: Overview of Pediatric Renal Replacement Therapy in Acute Kidney Injury. Semin Dial (Vol. 22, No. 2, pp. 180-184). Oxford, UK: Blackwell Publishing Ltd.
10. Goleg, F. A., Kong, N. C. T., and Sahathevan, R. (2014): Dialysis-treated end-stage kidney disease in Libya: epidemiology and risk factors. IntUrolNephrol, 46(8), 1581-1587.
11. Greenbaum, L. A., Warady, B. A., and Furth, S. L. (2009, July): Current advances in chronic kidney disease in children: growth, cardiovascular, and neurocognitive risk factors. SEMIN NEPHROL (Vol. 29, No. 4, pp. 425-434). WB Saunders.
12. Gruskin AB, Baluarte HJ, Dabbagh S. Hemodialysis and peritoneal dialysis. In: Edelman MC, editor. Pediatric kidney disease. Boston: Little Brown; 1992. p. 827.
13. Harambat, J., Van Stralen, K. J., Kim, J. J., and Tizard, E. J. (2012): Epidemiology of chronic kidney disease in children. PediatrNephrol, 27(3), 363-373.
14. Iseki, K., Tozawa, M., and Takishita, S. (2003): Effect of the duration of dialysis on survival in a cohort of chronic haemodialysis patients. Nephrol Dial Transplant, 18(4), 782-787.
15. Kidney Disease Outcomes Quality Initiative. KDOQI Clinical Practice Guideline and Clinical Practice Recommendations for anemia in chronic kidney disease: 2007 update of hemoglobin target. Am J Kidney Dis. 2007;50:471-530.
16. Lindsay, R. M., Nesrallah, G., Suri, R., Garg, A., and Moist, L. (2004): Is more frequent hemodialysis beneficial and what is the evidence? CurrOpinNephrolHypertens, 13(6), 631-635.
17. Mehrotra, R., Marsh, D., Vonesh, E., Peters, V., and Nissenson, A. (2005): Patient education and access of ESRD patients to renal replacement therapies beyond in-center hemodialysis. Kidney Int, 68(1), 378-390.
18. Nurko, S. (2006): Anemia in chronic kidney disease: causes, diagnosis, treatment.Cleve Clin J Med, 73(3), 289.
19. Rees, L. (2009): Long-term outcome after renal transplantation in childhood.PediatrNephrol, 24(3), 475-484.
20. Salma A. Bukhatwa, Wafa M. Almajbri, Waed T. Alzuwawi, Turkeya Y. Ellgeryni and Narges M. Kablan. (2019): LABORATORY PROFILES OF LIBYAN PATIENTS ON HEMODIALYSIS: A RETROSPECTIVE STUDY IN TWO MAIN HOSPITALS IN BENGHAZI CITY**.** Int. J. of Adv. Res. 7 (May). 821-825]
21. Sauod, E. A. B. B., and Aklifa, A. A. (2017): End-stage renal disease in children on maintenance dialysis in Benghazi, Libya. Ibnosina J Med Biomed Sci, 9(5), 128.
22. Sethi, S. K., Bunchman, T., Raina, R., and Kher, V. (2014): Unique considerations in renal replacement therapy in children: core curriculum 2014. Am J Kidney Dis, 63(2), 329-345.
23. Shroff, R., and Ledermann, S. (2009): Long-term outcome of chronic dialysis in children. PediatrNephrol, 24(3), 463.
24. Sirin, A., Emre, S., Alpay, H., Nayir, A., Bilge, I., and Tanman, F. (1995): Etiology of chronic renal failure in Turkish children. PediatrNephrol, 9(5), 549-552.
25. Sinnakirouchenan, R., and Holley, J. L. (2011): Peritoneal dialysis versus hemodialysis: risks, benefits, and access issues. Adv Chronic Kidney Dis, 18(6), 428-432.
26. Srivastava RN. Renal replacement therapy in children. Indian Pediatric.1987;24:1061-2.

27. Staples, A. O., Wong, C. S., Smith, J. M., Gipson, D. S., Filler, G., Warady, B. A., ... and Greenbaum, L. A. (2009): Anemia and risk of hospitalization in pediatric chronic kidney disease. Clin J Am SocNephrol, 4(1), 48-56.
28. Suri, R. S., Nesrallah, G. E., Mainra, R., Garg, A. X., Lindsay, R. M., Greene, T., &Daugirdas, J. T. (2006). Daily hemodialysis: a systematic review. Clin J Am SocNephrol, 1(1), 33-42.
29. Youssef DM and Neemat-Allah MA. (2013): Hemodialysis in children: eleven years in a single center in Egypt. Iran J Kidney Dis. 1;7(6):468..
30. Zaied AY, Sassi MA, Khattab KM and Rahman ZS. (2003): Complication of arteriovenous fistula in patients on maintenance hemodialysis programme in Benghazi. JMJ 2:27-30.