

Volume No. 7 Issue No. 1
10 Jan 2024

ISSN 2789-2093

TUJMS

Tobruk University Journal Of Medical Sciences

Editorial Board
Professor Nagi Idris
Editor-in-chief of Tobruk University
Journal of Medical Sciences



Email: nagi.idris@tu.edu.ly

Content

Pre-induction cervical ripening by Foley's catheter in relative indication of caesarean section

Authors: Inas A. Yahea

----- *Pages: 1-7*

The incidence of children's eye injuries in Tobruk: a prospective study

Authors: Fathy Abdolmejed, Ensaf Abaza, Khalid Almajri, Gumma Almusmari

----- *Pages: 8-12*

Sensitivity and Resistance Patterns of Urinary Tract infections

Authors: Moftah El garba, Jalal A. Boderraha.

----- *Pages: 13-19*

Nutritional status among paediatric age group with chronic Renal failure undergoing haemodialysis.

Authors: Amal R. Agila, Ambarka Eid.H Kreim

----- *Pages: 20-29*

Depression among Patients Undergoing Maintenance Hemodialysis at a Nephrology Department in Benghazi Medical Center, Libya

Authors: Zinelabedin Mohamed, Alqasim Abdulkarim, Kathloun Elkaseh, Naeima Mukhtar El Tikali, Mahmoud M M Alashqar, Nael A E Qudaih, Sarah Muftah Younis, Khalil A K Tamoos, Eman F A Altarhouni.

----- *Pages: 30-39*

Pre-induction cervical ripening by Foley's catheter in relative indication of cesarean section

Inas A. Yahea*

Faculty of medicine, Gynecology and Obstetrics Department, Tobruk University, Libya.

Received 08 Sep 2023; Accepted 09 Nov 2023; published 10 Jan 2024

*Correspondence: Inas A. Yahea; inas.ali.yhea@tu.edu.ly

Abstract

Introduction: The rate of caesarean section (CS) has continued to rise upward. Many complications could occur during C-section. The balloon catheter, including Foley's single-balloon catheter, appears to be a widely accepted mechanical method and is recommended by the WHO for the normal vaginal induction process. Aim of the work: To evaluate the success rate of pre-induction cervical ripening with Foley's catheter in cases of relative indication for caesarean section and increase rate of vaginal delivery within 24 hours in Tobruk-Libya. **Patients, Materials and Methods:** Prospective case control study in Gynecology and Obstetrics department at Tobruk Medical Center, Libya from January 2020 to December 2020. The study group include 146 selected cases of relative indications for caesarean section: (10) cases of grand multi (controlled HTN - controlled DM - cardiac cases), (6) cases of multigravida breech, (20) cases of oligohydramnios (AFI-3-4cc) In grand multi, (24) cases of grand multi post-date and (86) cases of previous C/S (PROM, post-date and with medical cardiac disease as DM - HTN). Women scheduled for induction of labor between 37-41 weeks of gestation admitted to maternity with singleton. **Results:** Most of patient expel within 4-6 hours and bishop score obtained then amniotomy done. Most of them were delivered without augmentation. Few cases need augmentation by 1 unite syntocinon. A few cases failed and did not expel the catheter and shifted to C/S. Very few cases are complicated by chorioamnionitis. Total cases are 146 with 132 (90.4 %) cases delivered normal within 24 – 48 hours while 14 (9.6 %) cases ended by C/S **Conclusion:** Cervical ballooning by Foley's catheter is a pre-induction safe method, efficient, and offering potential to increase the rate of vaginal deliveries in pregnant women with relative indication for cesarean section

Keywords: Cervical ripening; Foley's catheter; cesarean section.

Introduction

Over the past decade, the rate of caesarean section (CS) has continued to rise upward [1]. According to the World Health Organization global survey, the CS rate varies widely according to the geographical regions, with country-level rates ranging from less than 10% to more than 50%. [2–4] Although evidence has shown CS can reduce risks of maternal and perinatal mortality and morbidity, [5,6] the long-term risks and benefits of CS, especially without medical indications, remain unclear [7,8]. The reasons for the rise in the rate of cesarean sections have fully understood [9]. However, some causative reasons are old age of women especially those without any children [10], women with fewer children, fetuses in the breech position, prevalence of obesity, women with preeclampsia and in the 40th week of pregnancy [11]. Many complications could be occurred during C-section as entrapment of the fetus's head within the pelvis, rupture of the cervix with bleeding, damage to the uterine vessels in the low uterus segment incision, bleeding from the placental bed, uterine atony, damage to the bladder, damage to the ureter and bowel, and thromboembolism [12]. Tachypnea, infantile respiratory distress syndrome, hospitalization of the neonate in the intensive care unit (ICU) [13] and the

complications associated with anesthesia [14]. Methods used for cervical ripening can be broadly divided into mechanical devices and pharmacologic options [15, 16]. The balloon catheter, including Foley's single-balloon catheter, appears to be a widely accepted mechanical method and is recommended by the WHO for the induction process [17]. Mechanical ripening devices apply pressure to the internal face of the cervix, directly overstretching the lower uterine segment and indirectly increasing the localized secretion of prostaglandin. In addition to the local effect, mechanisms that involve neuroendocrine reflexes (such as the Ferguson reflex) may promote the onset of contractions [18]. Due to increased incidence of cesarean sections in Tobruk, Libya, I was able to evaluate the success rate of pre-induction cervical ripening with Foley's catheter in cases of relative indication for caesarean section and increase rate of vaginal delivery within 24 hours.

Patients, Materials and Methods

The present study is a case control prospective study in Gynecology and Obstetrics department at Tobruk Medical Center, Libya from January 2020 to December 2020.

The study group include 146 selected cases of relative indications for caesarean section which include:

- Ten (10) cases of grand multi (controlled HTN - controlled DM - cardiac cases).
- Six (6) cases of multigravida breech.
- Twenty (20) cases of oligohydramnios (AFI-3-4cc) In grand multi.
- Twenty-four (24) cases of grand multi post-date.
- Eighty-six (86) cases of previous C/S (PROM, post-date and with medical disease as cardiac disease, DM and HTN)

Women scheduled for induction of labor between 37-41 weeks of gestation admitted to maternity with singleton. Alive or died with bishop score less than 4 – intra cervical single balloon (20-22 fr) inflated with 70-80 cc normal saline with good traction on medial aspect of thigh other patient were excluded as antepartum hemorrhage, non-reassuring CTG, previous myomectomy, T- shop incision, multi scars. Catheter kept 12-24 hours under cover of antibiotics.

Ethical considerations: permissions were obtained from the research ethical committee of Tobruk University to perform the study.

Statistical Analysis

In the process of statistical analysis, the collected data underwent coding, followed by entry and examination utilizing SPSS version 22 (Statistical Package for Social Science). Descriptive statistics were employed for categorical variables, presenting frequency and percentage, while numerical variables were represented in terms of mean and standard deviation (mean \pm SD). To assess significance, appropriate statistical tests were applied, including the Chi-Square (χ^2) test for categorical data. P-values equal to or less than 0.05 were considered indicative of statistical significance.

Results

Most of patient expel within 4-6 hours and bishop score obtained then amniotomy done. Most of them were delivered without augmentation. Few cases need augmentation by 1 unite syntocinon. A few cases failed and did not expel the catheter and shifted to C/S. Very few cases

are complicated by chorioamnionitis. Total cases are 146 with 132 (90.4 %) cases delivered normal within 24 – 48 hours while 14 (9.6 %) cases ended by C/S (Table-1).

Case	Number	Fate	Complications
Previous C/S PROM	43	2cases of VBAC ended by c/s	3 cases chorioamnionitis and delivered vaginally
Previous C/S post date	28	2 cases VBAC ended by C/S	
Previous C/S with medical disease as HTN - DM - antiphospholipid	15	5 cases ended by C/S	
Grand multi-PROM - oligohydramnios	20	1cases ended by C/S	2 case chorioamnionitis and delivered vaginally
Grand multi post date	24		
Breech - grand multi post date	6	3 cases ended by C/S	
Grand multi with medical disease (HTN - DM - cardiac)	4 - HTN 5 - DM 1 - Cardiac	3 cases ended by C/S	

Table (1): Number of cases with their fate and complications.

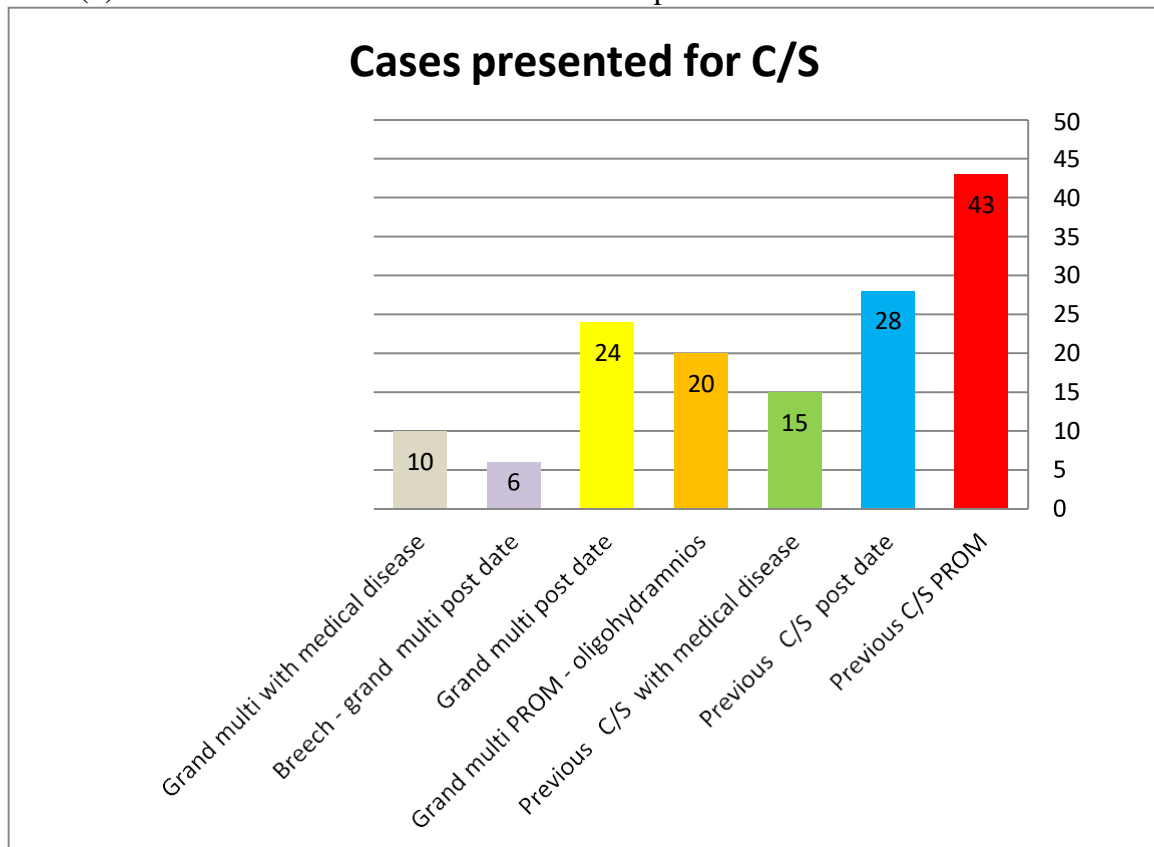


Figure (1): Cases presented for C/S

Correlations between cervical dilatation success and presented cases.

Univariate analysis revealed no significant differences between Cervical ballooning with Foley's catheter and the presented cases (Table 2).

Presented cases	Cervical ballooning with Foley's catheter		Chi-square test
	Normal vaginal delivery	C/S	
	Previous C/S		
PROM (43 cases)	41 (95.3%)	2 (4.7%)	P=0.00594
Post-date (28 cases)	26 (92.9%)	2 (7.1%)	
With medical disease (15 cases)	10 (66.7%)	5 (33.3%)	
	Grand multi		
PROM - oligohydramnios (20 cases)	19 (95%)	1 (5%)	P=0.03094
Breech post-date (6 cases)	3 (50%)	3(50%) (16.7%)	
With medical disease (10 cases)	7(70%)	3(30%)	

*p-value <0.05 was statistically significant.

Table (2): Correlations between cervical dilatation success and presented cases.

Discussion

Balloon catheters were initially designed for cervical dilatation and ripening during labor induction. The best indicator of efficacy is the bishop score rise. However, when correlated with baseline data, the bishop score served only as a secondary outcome. Therefore, we could use the bishop score after catheter removal (the second Bishop score) to roughly calculate this effect size [18]. In support of this finding, Hoppe et al. [19] reported a Bishop score > 6 at balloon removal, and ripening success rates appeared to be higher. Atad et al. also reported similarly large average increments in the bishop scores for both nulliparous and multiparous women for the balloon catheter [20]. Ahmed, et al. [21] stated that women treated with a single balloon catheter had a shorter insertion to amniotomy time, while Pennell, et al. [22] and Rab, et al., [23] are preferring the single-balloon catheter. Ahmed and Mei-Dan [21, 24] suggested that the shorter interval between insertion and expulsion for the single-balloon catheter likely resulted in the observed shorter induction to delivery interval. In addition, Salim, et al. [25] found that women who spontaneously expelled their catheter demonstrated favorable outcomes with regards to shorter times from induction to delivery. The studies included Deshmukh et al, [26] Laddad et al, [27] Jozwiak et al, [28] and Al-Taani [29] reported that a shorter time to delivery was found with the use of an intracervical Foley catheter balloon. Advantages of this technique include lower cost compared with some drugs, low risk of tachysystole, few systemic side effects, and convenient storage requirements (no refrigeration or expiration, which are issues for some drugs) [30,31,32].

Limitations of the study

Our study has some limitations. First, a small sample size was used to identify the value of cervical ballooning by Foley's catheter as pre-induction for normal vaginal delivery because of the short study period. Second, there is not many studies found in our areas for comparison and discussion.

Conclusion

In conclusion, we found that cervical ballooning by Foley's catheter is a pre-induction safe method, efficient, and offering potential to increase the rate of vaginal deliveries in pregnant women with relative indication for cesarean section.

References

1. Betran AP, Ye J, Moller AB, et al. The increasing trend in caesarean section rates: global, regional and national estimates: 1990–2014. *PLoS One* 2016;11:e0148343.
2. Shah A, Fawole B, M'imunya JM, et al. Cesarean delivery outcomes from the WHO global survey on maternal and perinatal health in Africa. *Int J Gynaecol Obstet* 2009;107:191–7.
3. Villar J, Valladares E, Wojdyla D, et al. Cesarean delivery rates and pregnancy outcomes: the 2005 WHO global survey on maternal and perinatal health in Latin America. *Lancet* 2006;367:1819–29.
4. Lumbiganon P, Laopaiboon M, Gülmezoglu AM, et al. Method of delivery and pregnancy outcomes in Asia: the WHO global survey on maternal and perinatal health 2007–08. *Lancet* 2010;375:490–9.
5. Molina G, Weiser TG, Lipsitz SR, et al. Relationship between cesarean delivery rate and maternal and neonatal mortality. *JAMA* 2015;314:2263–70.
6. Thomas S, Meadows J, McQueen KA. Access to cesarean section will reduce maternal mortality in low-income countries: a mathematical model. *World J Surg* 2016;40:1537–41.
7. Ecker J. Elective cesarean delivery on maternal request. *JAMA* 2013;309:1930–6.
8. NIH State of the Science Conference: cesarean delivery on maternal request. *Adv Neonatal Care* 2006;6:171–2.
9. Jafarzadeh A, Hadavi M, Hassanshahi G, Rezaeian M, Vazirinejad R, Aminzadeh F, Sarkoohi A. Cesarean or Cesarean Epidemic? *Arch Iran Med*. November 2019;22(11):663-670.
10. Bayrampour H, Heaman M. Advanced maternal age and the risk of cesarean birth: a systematic review. *Birth*. 2010;37(3):219-26.
11. Hassain GS. Cesarean section in Babylon Province. *Int J Med Sci*. 2015;3(4):113-5.
12. Miller R. Miller's anesthesia. 8th ed. Philadelphia: Elsevier; 2015.
13. Mylonas I, Friese K. Indications for and risks of elective cesarean section. *Dtsch Arztebl Int*. 2015;112(29-30):489-95.
14. Gibbons L, Belizan JM, Lauer JA, Betrán AP, Merialdi M, Althabe F. The global numbers and costs of additionally needed and unnecessary caesarean sections performed per year: overuse as a barrier to universal coverage. *World health report*. Geneva: WHO; 2010.
15. Jozwiak M, Bloemenkamp KW, Kelly AJ, Mol BW, Irion O, Bouvain M. Mechanical methods for induction of labour. *Cochrane Database Syst Rev*. (2012, 3):CD001233.
16. ACOG Practice Bulletin No. 107: induction of labor. *Obstet Gynecol* 2009, 114(2 Pt 1):386–397.
17. WHO Recommendations for Induction of Labour. edn. Geneva; 2011.
18. Liu X, Wang Y, Zhang F, Zhong X, Ou R, Luo X and Qi H. Double-versus single-balloon catheters for labour induction and cervical ripening: a meta-analysis. *BMC Pregnancy and Childbirth* (2019) 19:358.

19. Hoppe KK, Schiff MA, Peterson SE, Gravett MG. 30 mL single- versus 80 mL double-balloon catheter for pre-induction cervical ripening: a randomized controlled trial. *J Matern Fetal Neonatal Med.* 2016;29(12):1919–25.
20. Atad J, Bornstein J, Calderon I, Petrikovsky BM, Sorokin Y, Abramovici H. Nonpharmaceutical ripening of the unfavorable cervix and induction of labor by a novel double balloon device. *Obstet Gynecol.* 1991;77(1):146–52.
21. Sayed Ahmed WA, Ibrahim ZM, Ashor OE, Mohamed ML, Ahmed MR, Elshahat AM. Use of the Foley catheter versus a double balloon cervical ripening catheter in pre-induction cervical ripening in postdate primigravidae. *J Obstet Gynaecol Res.* 2016;42(11):1489–94.
22. Pennell CE, Henderson JJ, O'Neill MJ, McChlery S, Doherty DA, Dickinson JE. Induction of labour in nulliparous women with an unfavourable cervix: a randomised controlled trial comparing double and single balloon catheters and PGE2 gel. *BJOG.* 2009;116(11):1443–52.
23. Rab MT, Mohammed AB, Zahran KA, Hassan MM, Eldeen AR, Ebrahim EM, Yehia M. Transcervical Foley's catheter versus Cook balloon for cervical ripening in stillbirth with a scarred uterus: a randomized controlled trial. *J Matern Fetal Neonatal Med.* 2015;28(10):1181–5.
24. Mei-Dan E, Walfisch A, Suarez-Easton S, Hallak M. Comparison of two mechanical devices for cervical ripening: a prospective quasi-randomized trial. *J Matern Fetal Neonatal Med.* 2012;25(6):723–7.
25. Salim R, Zafran N, Nachum Z, Garmi G, Kraiem N, Shalev E. Single-balloon compared with double-balloon catheters for induction of labor: a randomized controlled trial. *Obstet Gynecol.* 2011;118(1):79–86.
26. Deshmukh VL, Yelikar KA, Deshmukh AB. Study of intra-cervical Foley's catheter and PGE2 gel. *J Obstet Gynecol India* 2011;61:418–21.
27. Laddad MM, Kshirsagar NS, Karale AV. A prospective randomized comparative study of intra-cervical Foley's catheter insertion versus PGE2 gel for pre-induction cervical ripening. *Int J Reprod Contracept Obstet Gynecol* 2013;2:217–20.
28. Jozwiak M, Oude Rengerink K, Benthem M, et al. Foley catheter versus vaginal prostaglandin E2 gel for induction of labour at term (PROBAAT Trial): An open-label, randomised controlled trial. *Lancet* 2011;378:2095–103.
29. Al-Taani MI. Comparison of prostaglandin E2 tablets or Foley catheter for labour induction in grand multiparas. *East Med Health J* 2004;10:547–53.
30. Du YM, Zhu LY, Cui LN, Jin BH, Ou JL. Double-balloon catheter versus prostaglandin E2 for cervical ripening and labor induction: a systematic review and meta-analysis of randomized controlled trials. *BJOG.* 2016 Aug 17.
31. Alfirevic Z, Keeney E, Dowswell T, Welton NJ, Medley N, Dias S. Methods to induce labour: a systematic review, network meta-analysis and cost-effectiveness analysis. *BJOG.* 2016;123 (9):1462-70.
32. Durie D, Lawal A, Zegelbone P. Other mechanical methods for pre-induction cervical ripening. *Semin Perinatol.* 2015;396:444-9.

The incidence of children's eye injuries in Tobruk: a prospective study

Fathy Abdolmejed^{1*}, Ensaf Abaza¹, Khalid Almajri², Gumma Almusmari¹

¹Ophthalmology Department, Tobruk University, Tobruk, Ophthalmology

²Department, Derna University, Derna

Received 04 Oct 2023; Accepted 05 Jan 2024; published 10 Jan 2024

*Correspondence: Fathy Abdolmejed; Fathy.Abdolmejed@tu.edu.ly

Abstract

Introduction: Ocular trauma constitutes a significant cause of acquired blindness in the pediatric population. Understanding the epidemiology of ocular trauma in children, particularly in comparison to other age groups, is vital for informing preventive measures and healthcare planning. This study aims to investigate the prevalence and characteristics of ocular trauma cases seen at the Tobruk Medical Centre in Libya over the course of one year. **Methods:** A retrospective study was conducted in 2019, encompassing patients of all age groups who were presented with ocular trauma in both the Ophthalmology Department and the Emergency Department of Tobruk Medical Centre. Data pertaining to age, sex distribution, duration of presentation, mode of injury, type of injury, and final visual outcomes were analyzed. **Results:** Among the 201 patients included in the study, 76 were children, comprising 37.8% of the total cases. Of the pediatric cases, 68.5% were male, while 31.5% were female. Notably, a significant proportion of children (77.6%) suffered ocular injuries at home, with altercations accounting for 7.8%, school-related incidents at 6.5%, and car accidents and workplace accidents contributing 5.2% and 2.6% respectively. Approximately 29% of cases required hospital admission, with 22% of patients necessitating surgical interventions. Blunt trauma was the most frequent type of ocular injury, representing 72% of cases. Penetrating trauma with intraocular foreign bodies (IOFB) accounted for 6.5% of cases. The final visual outcomes were recorded for 16 patients. Alarming results showed that 8% experienced severe vision impairment, with a visual acuity of Hand Movement or worse. Additionally, 2.6% of the trauma cases resulted in blindness with no perception of light. Severe impairment of vision is statistically significant related to cases with open rupture globe ($P < 0.001$). **Conclusion:** This study highlights the substantial vulnerability of children to ocular trauma and underscores the need for increased supervision and preventive measures, particularly in the home environment. Notably, open globe injuries can lead to permanent blindness. Preventive efforts should include the secure storage of sharp objects to safeguard against pediatric ocular trauma and its potentially devastating consequences.

Keywords: Ocular trauma, Open globe injuries, Closed globe injuries, Tobruk medical center-Libya.

Introduction

Eye injuries are one of the most urgent ophthalmological emergencies. The paediatric age group is more susceptible to ocular trauma, especially during playtime at home. In the United States, about thousand children get eye damage from accidents at home. Each year, about 250 thousand children get eye damage from accidents at home, at play, or in the car. (Barry 2019) There are numerous forms of eye trauma, they can be as close-globe injury with non-sharp objects, ultraviolet radiation, or chemical exposure, or as a penetrating injury with sharp objects or foreign bodies. (Sahraravand 2020) In blunt non-perforating trauma, signs include proptosis, decreased visual acuity, pain, lid ecchymosis, chemosis, mydriasis, afferent pupillary defect, increased IOP, and ophthalmoplegia. (Morris 2014) Treatment requires an immediate ophthalmologic consultation. conservative management with ice packs, pain control, bed rest, control of intraocular pressure, and systemic steroids. (Malek et. al. 2012) In open globe injuries, usually ruptures occur in areas where the sclera is thinnest (at the limbus or at the insertions of the extraocular muscles). (Sahraravand 2020) The loss of the aqueous from the anterior chamber and the vitreous or choroidal tissue through a wound are the most common signs of rupture. (Das 2020) In rupture-glob cases, management needs admission to the hospital and urgent interventions such as antibiotics, antiemetics, pain management, and urgent surgical repair of the wound. (Velibanti Nhlanhla Sukati 2012). In open-globe injuries, delaying medical attention can cause the damaged areas to worsen and result in permanent loss of vision. To achieve better therapeutic success, we need urgent surgical interventions to prevent significant morbidity and decrease the chance of blindness, which is common in these cases. (Puodžiuvienė 2018)

Methods

In a prospective study of ocular trauma, we included all new patients with eye injuries who received treatment at the Eye Department of Tobruk Medical Center in 2019. The data collection comes from direct histories of the patients or their relatives, examinations, and patient questionnaires. We record age, gender, laterality, possible previous amblyopia, detailed status findings at the first presentation, time at the first consultation after injury, diagnoses, and type of management. We analyze the data, present the distributions (Excel, Microsoft Office 2019), and calculate the percentages from the reported results. The purpose of this study is to identify the patterns of ocular trauma in children, types of injuries, and visual and post-traumatic anatomical outcomes in patients presenting to our hospital.

Results

Over the course of one year between (01.01.2019- 31.12.2019), there were 201 trauma patients at Tobruk Medical Center. The time interval between injury and receiving consultation in the first three hours was in 45% of patients, 51.4% of cases came to the hospital after 24 hours, and 5.5% after 3 days. The rupture can occur with severe blunt trauma at the thinnest and weakest area of the eye or because of penetration by sharp objects. The long period of time before achieving proper management leads to a worsening of the visual outcome because more normal contents of the eye are lost. The mean age was 25.12 years (range between 1 and 80 years) and the mean age of children group 14 years.

Table 1. show distribution of age group with trauma in one year in Tobruk medical center:

	Age average	total	male	female
young age	(1-18 year)	109	89	20
children	(19-50 year)	76	52	24
old age	(older than 50 yr.)	16	13	3

Of the 201 trauma victims at Tobruk Medical Center, 76 (37.8%) were children. Males made up 68.5% of the pediatric patients, while females made up 31.5%. Children are most often injured at home (77.6%), then at school (6.5%), in cars (5.2), at work (2.6%), and in fights (7.8%).

Table 2. shows different types of eye injuries in relation to the site of trauma in children:

Type of trauma	at home	at school	fighting at street	workplace	car accident
blunt object (non-perforating)	37	5	3	1	3
perforating trauma	12	-	-	1	1
fall down	6	-	-	-	-
chemical injury	4	-	-	-	-
Gunshot injury (perforating)	-	-	3	-	-

There were 29% of cases that needed to be admitted to the hospital, and 17 patients (22%) needed surgical interventions. The most common trauma was blunt trauma (72%). Penetrating trauma with IOFB accounted for 6.5% of cases. Both open and close injuries can lead to loss of vision through different mechanisms. The visual outcome was recorded in 61 patients; there were 6 patients' (8%) results with severe impairment of vision (vision HM or less), and blindness-resulted in 2.6% of trauma cases. Severe defects in vision cases are statistically significant and related to cases of open globes with sharp objects or foreign body injuries (p value < 0.001). Lesions that cause damage to the most delicate parts of the eye, such as the optic nerve or macula, from blunt objects or traumatic sharp objects or due to the long-term loss of normal contents of the eyeball, can cause poor vision. Children require extra attention since they are frequently exposed to eye damage. Sharp items should be kept out of children's reach since open globe injuries have the potential to cause blindness.

Discussions

Eye injury in children is a common reason for an emergency in the ophthalmology department. The injuries may be due to blunt, penetrating trauma, chemical agents, or ultraviolet radiation. (Alem KD, 2019) Children's eye injuries account for 37.8% of all eye trauma at Tobruk Medical Center in one year (2019). Hospital admissions only account for around 29% of total children's eye injuries, and 22% need surgical interventions (MacEwen 1999). Closed globe injury with blunt objects at home was the commonest eye injuries in children and more common in males. Because children's vision systems are still under development, eye injury can cause significant vision impairment. As in other studies, ruptured eye injuries result in clinically as well as statistically significant poor vision (p value <0.005) (Guly 2006) (Beshay 2017). Usually, trauma patients presenting with visual acuity correspond with an increasing severity of ocular injury; children with perforating injuries or ruptures usually present with worse vision than those with a closed eye globe. In our study, there were 81% of children with eye injuries whose visual acuity (VA) was recorded at presentation; others were uncooperative. 23.7% had a VA of 6/6, and 35.5% had a VA of <6/60. (Sujit Das, Manika Rana 2020) (Sahraravand, A 2020) When a child has any type of eye trauma, they should see an ophthalmologist as soon as possible. Longstanding injuries lead to more destruction of the normal tissue of the eye. Early consultation can save the vision of children with eye injuries. (Alem et al., 2019) In the combined study, about 98% of the patients presented after 6 hours post-trauma. (Cassen JH1997) Patient education and safety measures like wearing glasses during sports are very important to decrease the risk of child trauma. It is highly recommended and important to make the public aware of the risks and causes of eye trauma because most eye injuries can be prevented.(Cassen 1997 and Morris 2013)

Conclusion

Ocular trauma in children is a common cause of emergency eye clinic visits. Most cases usually worsen before receiving a consultation, and early consultation can save vision. Ocular morbidity can still be prevented in the case of an eye injury. Thus, we require health prevention strategies.

Declaration

We declare that the clinical research paper titled '[The incidence of children's eye injuries in Tobruk: a prospective study]' has received ethical approval from the relevant regulatory bodies and/or institutional review board, such as the Tobruk Medical Centre Ethics Committee, prior to its initiation. This statement serves as an assurance that the research study conducted for this paper adheres to the highest ethical standards, ensuring the safeguarding of human subjects and upholding the integrity of the research process.

Limitations of this study

This study has two limitations; due to participant aging, we do not include occurrences where data is not accessible, and a small number of the studies in this topic.

References

1. Alem KD, Arega DD, Weldegiorgis ST, Agaje BG, Tigneh EG (2019) Profile of ocular trauma in patients presenting to the department of ophthalmology at Hawassa University: Retrospective study. PLoS ONE 14(3): e0213893. doi:10.1371/journal.pone.0213893
2. Barry RJ, Sii F, Bruynseels A, Abbott J, Blanch RJ, MacEwen CJ, Shah P. The UK Paediatric Ocular Trauma Study 3 (POTS3): clinical features and initial management of injuries. *Clin Ophthalmol.* 2019; 13:1165-1172
3. Beshay N, Keay L, Dunn H, Kamalden TA, Hoskin AK, Watson SL. The epidemiology of open Glob injuries presenting to a tertiary referral eye hospital in Australia. *injury* 2017 doi. 10.1016/j.injury2017.04.035.
4. Cassen JH. Ocular trauma. *Hawaii Med J.* 1997 Oct;56(10):292-4. PMID: 9385749.Oct
5. Guly CM, Guly HR, Bouamra O, Gray RH, Lecky FE. Ocular injuries in patients with major trauma. *Emerg Med J.* 2006 Dec;23(12):915-7. doi: 10.1136/emj.2006.038562.
6. Malik, Zeshan Ali, A. Rehman, Muhammad Moin, Mumtaz Hussain. Epidemiology of Penetrating Ocular Trauma Irfan Qayyum Pak J Ophthalmol 2012, Vol. 28 No.
7. MacEwen, CJ. Et al. Eye injuries in children: the current picture. *Br J Ophthalmol.* 1999;83:933-936
8. Morris, D., Willis, S., Minassian, D. et al. The incidence of serious eye injury in Scotland: a prospective study. *Eye* 28, 34–40 (2014). <https://doi.org/10.1038/eye.2013.213>
9. Puodžiuvienė, E., Jokūbauskienė, G., Vieversytė, M. et al. A five-year retrospective study of the epidemiological characteristics and visual outcomes of pediatric ocular trauma. *BMC Ophthalmol* 18, 10 (2018). <https://doi.org/10.1186/s12886-018-0676-7>
10. Sahraravand, A., Haavisto, AK., Puska, P. et al. Work tool-related eye injuries: Helsinki Ocular Trauma Study. *Int Ophthalmol* 40, 753–761 (2020). <https://doi.org/10.1007/s10792-019-01237-y>
11. Sujit Das1, Manika Rana2 Patterns of Ocular Trauma Presenting to the Tertiary Eye Care Centre in the Islands of Andaman and Nicobar. *Delhi journal of ophthalmology* 2020
12. DOI:<http://dx.doi.org/10.7869/djo.540>
13. Velibanti Nhlanhla Sukati: Ocular injuries - a review December 2012, the epidemiology of ocular trauma presented to Provincial hospital South Africa. DOI:10.4102/aveh.v7i1i2.73

Sensitivity and Resistance Patterns of Urinary Tract infections

Moftah El garba*, Jalal A. Boderraha.

Al-Wahda therapeutic and teaching hospital, Derna - Libya

Received 04Sept 2023; Accepted 10 Nov 2023; published 10 Jan 2024

*Correspondence: Muftah EL-Garba; elgarba_uro@yahoo.com

Abstract

Objectives: To identify the most common bacteria causing urinary tract infections (UTI) and their sensitivity and resistance patterns for some antimicrobial agents. **Methodology:** A total of 773 cases from outpatients and inpatients attended Al-Wahda therapeutic and teaching hospital, Derna - Libya, clinically suspected as having UTI during 2021 and 2022, were examined for microbiological and pattern of antibiotic susceptibility by disc diffusion method. **Results:** By using direct smear microscopy and routine culture methods, different bacterial species were isolated from only 262 (33.9%), the remaining 511 (66.1%) of cases showed no bacterial growth. Bacteriological examination of urine showed that *Escherichia coli* was found in 106 (40.4%) of cases, *Klebsiella* in 59 (22.5%), *Staph. epidermidis* in 35 (13.3%), *Staph. aureus* in 32 (12.2%), *Proteus* spp. in 12 (4.5%), *Pseudomonas* in 8 (3%), Enterococci in 6 (2.3%), and *Corynebacteria* in 4 (1.5%) of cases. The antimicrobial sensitivity pattern in the treatment of UTIs indicated that the Ciprofloxacin shows (80.2% sensitivity) , Amoxicillin (70.2%), Nitrofurantoin (64.5%), and Ceftriaxone (61.8%). Meanwhile, for treating UTI produced by *Enterococci*, the antimicrobial drug of choice is Amoxicillin (70.2% sensitivity), Nalidixic acid (60.3% sensitivity), and Ampicillin (9.2% sensitivity), while for treating *Pseudomonas* spp, the drug of choice should be member of Fluoroquinolones group as Ciprofloxacin (80.2% sensitivity), and Sulfamethoxazole plus Trimethoprim (26.3% sensitivity). **Conclusion:** Urinary tract infection is a major cause of morbidity, especially in young children. Trends in choice of antibiotic treatment may change depending on locally determined resistances, common pathogens, and cost issues.

Keywords: Urinary tract infections (UTI), bacteria. disc diffusion method, Antibiotic sensitivity / resistance drugs.

Introduction

Antibiotics are used to prevent infection and to treat patients with proven or suspected infections, and to administer a safe and cost-effective dose of antibiotics that will eliminate the infecting or potentially infecting organism⁽¹⁾. Antibiotics are widely used, contributing to 35% of all prescriptions in health care facilities⁽²⁾. Overuse of antibiotics results in bacterial resistance not only to the antibiotic prescribed, but often to other antibiotics in the same classes or groups⁽³⁾. When infections from Antimicrobial Resistant Organisms occur, there is increased mortality, especially among those with underlying diseases or multiorgan failure⁽⁴⁾.

In the past 30–50 years, the natural history of urinary tract infection (UTI) has changed because of the introduction of antibiotics and improvements in healthcare. This change has contributed to uncertainty about the most appropriate and effective way to manage UTI and whether investigations and follow-up are justified. UTI is a common bacterial infection in children, found in up to 5% of all febrile children under the age of 2 years presenting to emergency rooms⁽⁵⁾. A population-based study from the UK based on referral data collected over 4 years suggested that 11.3% of females and 3.6% of males will have had a UTI by the age of 16⁽⁶⁾.

Studies suggest that UTI has the incidence of first time and recurrent episodes of UTI in general practice ranges from 0.6% and 1.1% in boys and girls, respectively, aged under 1 year while it changes to 0.2% and 1.4% for boys and girls, respectively, aged between 5 and 14 years⁽⁷⁾.

Different antimicrobial regimens have been used in the treatment of UTI, differing in both type and duration of treatment. However, there is no consensus as to which antimicrobial should be used and how long treatment should be continued. The aim of the present study is to achieve more consistent clinical practice, based on accurate laboratory diagnosis and effective management hence reducing the emergence of other resistant forms of bacteria and minimizing the costs due to unnecessary antibiotic abuse, and to identify the most common bacteria causing urinary tract infections (UTI) and their sensitivity / resistance pattern of some antimicrobial agents.

Materials and Methods

A total of 772-midstream urine samples sent for microbiological study at the Central Lab. of Al-Wahda therapeutic and teaching hospital, Derna - Libya, were studied during six months from October 2021 to March 2022. Patients were clinically diagnosed according to criteria already established for UTI diagnosis⁽⁸⁾. A clean midstream urine sample is the recommended method for urine collection. In babies and infants' urine samples were collected in sterile self-adhesive plastic bags. When it was not possible or practical to collect urine by non-invasive methods, catheter samples 23(2.97%) or suprapubic aspiration (SPA) 7 (0.9%) were used. Before SPA is attempted, ultrasound guidance should be used to demonstrate the presence of urine in the bladder. Samples were sent to the laboratory within one hour after voiding when possible or kept refrigerated at 4°C to avoid multiplication of bacteria in urine resulting in false significant bacteriuria. Direct smear microscopy stained with Gram's stain and routine bacterial cultures (MacConkey agar, Mueller –Hinton agar, COLUMBIA agar base) were done. The quantitation of bacteria in urine samples was done using calibrated loops for cultivation. Antibiotic sensitivity test was supplied by Himedia Laboratories PVT. LTD. 23, Vadhani Ind, Est., LBS Marg, Mumbai- 400086, India, and Oxoid LTD., Dasingstoke, Hampshire. England.

Results

The study included 773 urine samples from patients clinically diagnosed as UTI in Al-Wahda therapeutic and teaching hospital.

Figure (1) shows that out of the 773 cases examined microbiologically 262 had growth on bacterial cultures, 173(66%) of them were children under 12 years old.

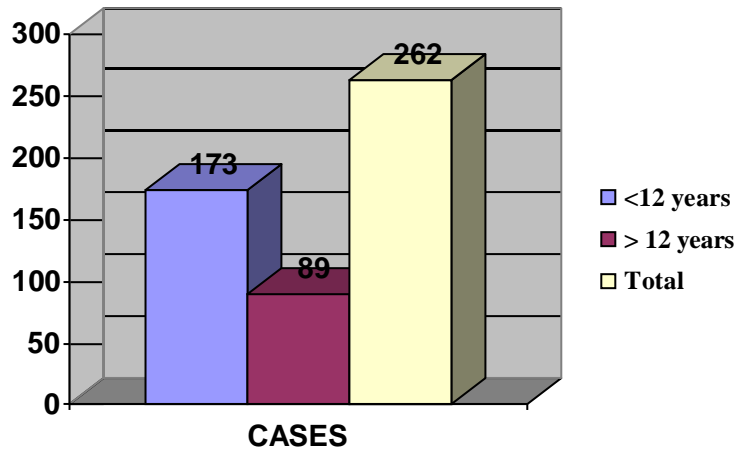


Fig. (1) Age distribution among All cases of positive culture.

Table (1) shows that UTI patients with no bacterial growth, represented 511 (66.1 %), meanwhile cases with positive bacterial growth, represented 262 (33.99 %).

Table (I) Frequency distribution of cases with positive cultures during study period.

MONTH	CASES WITH UTI	NO. OF +VE CULTURE	PERCENTAGE
October 2003	197	58	29%
November 2003	150	62	41%
October 2004	244	91	37%
November 2004	182	51	28%
Total	773	262	100%

The isolated pathogenic bacteria causing UTIs were *Escherichia coli* strains isolated in 106 (40.46%) in cases with UTI, *Klebsiella* in 59 (22.52%), *Staph. epidermidis* in 35 (13.3%), *Staph. Aureus* in 32 (12.12%), *Proteus* spp. in 12 (4.5%), while 8 (3.05%), 6 (2.29%), 4 (1.53%) of cases were produced by *Pseudomonas*, *Enterococci* and *Corynebacteria*, respectively. (Figure 2).

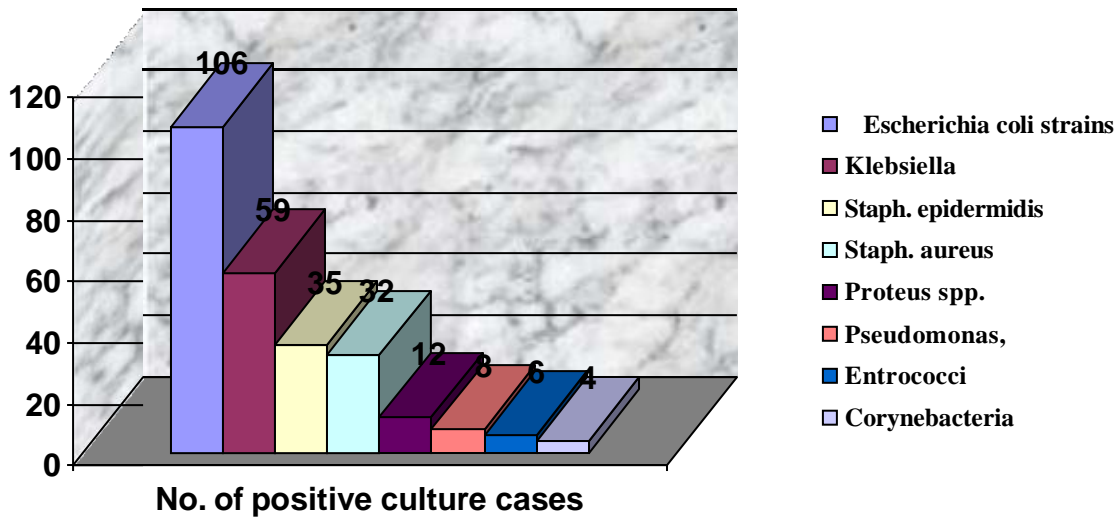


Fig. (2) The frequency distribution of pathogenic bacteria in positive cases.

Table (2) shows that *Escherichia coli* is the commonest cause of urinary tract infections especially in children, it was isolated from 106 (40.46%) cases with clinically suspected UTI. The pattern of antibiotic sensitivity for that isolated *Escherichia coli* strains from urine samples was as follows: Ampicillin 9.4%, Amoxycillin 70.8%, Nalidixic acid 67.9 %, ceftriaxone 73.6 %, sulfamethoxazole + trimethoprim 25.5%, cephalothin 21.7%, ciprofloxacin 85.5 %, Nitrofurantoin 71.7%, chloramphenicol 48.1%, Doxycycline 21.7%. *Klebsiella* organisms are Gram negative, non-motile, capsulated bacilli representing 59 (22.52%) of all isolated cases. Its pattern of antibiotic sensitivity was as follows: Ampicillin 0 %, Amoxycillin 71.2 %, Nalidixic acid 59.3%, Ceftriaxone 67.8%, Sulfamethoxazole + Trimethoprim 20.3%, Cephalothin 20.3%, Ciprofloxacin 71.2%, Nitrofurantoin 52.5%, Chloramphenicol 57.6%, Doxycycline 25.4%. *Staphylococcus aureus* are Gram positive cocci arranged in bunches, catalase, and coagulase positive were isolated from 32 (12.21%) cases with UTIs. Its pattern of antibiotic sensitivity was as follows: Ampicillin 9.4%, Amoxycillin 71.9%, Nalidixic acid 75%, Ceftriaxone 40.6%, Sulfamethoxazole + Trimethoprim 15.6%, Cephalothin 53.1%, Ciprofloxacin 75%, Nitrofurantoin 62.5%, Chloramphenicol 46.9%, Doxycycline 37.5%. *Staphylococcus epidermidis* are Gram positive cocci arranged in clusters, novobiocin sensitive and coagulase negative were isolated from 35 (13.35%) cases with UTIs. Its pattern of antibiotic sensitivity was as follows Ampicillin 8.5%, Amoxycillin 82.8%, Nalidixic acid 40.0%, Ceftriaxone 42.8%, Sulfamethoxazole + Trimethoprim 27%, Cephalothin 83.8%, Ciprofloxacin 81.1%, Nitrofurantoin 78.4%, Chloramphenicol 20%, Doxycycline 31.4%. *Enterococci* are Gram positive cocci arranged in short chains or mostly in pairs, and catalase negative were isolated from 6 (2.29%) cases with UTIs. Its pattern of antibiotic sensitivity was as follows Ampicillin 83.3%, Amoxycillin 100%, Nalidixic acid 66.7%, Ceftriaxone 100%, Sulphur methimazole + Trimethoprim 0%, Cephalothin 83.3%, Ciprofloxacin 50%, Nitrofurantoin 33.3%, Chloramphenicol 50%, Doxycycline 0%. *Pseudomonas spp* are motile Gram-negative bacilli, strictly aerobic and non-spore forming bacteria. The only species pathogenic for humans, pyocyanin, which gives the color to "blue pus", were isolated from 8 (3.05%) cases with UTIs. Its pattern of antibiotic sensitivity/resistance as follows: Ampicillin 0%, Amoxycillin 0%, Nalidixic acid 12.5%, Ceftriaxone 25%, Sulphur methimazole + Trimethoprim 100%, Cephalothin 0%, Ciprofloxacin 87.5%, Nitrofurantoin 0%, Chloramphenicol 0%, Doxycycline 12.5%. *Proteus spp.* is Enterobacteriaceae characterized

by swarming motility and urease production, representing 12 (4.58%) from all isolated cases. Its pattern of antibiotic sensitivity was as follows: Ampicillin 0%, Amoxicillin 41.6%, Nalidixic acid 50%, Ceftriaxone 66.6%, Sulfamethoxazole + Trimethoprim 50%, Cephalothin 16.6%, Ciprofloxacin 75%, Nitrofurantoin 66.6%, Chloramphenicol 41.6%, Doxycycline 25%. *Corynebacteria* are Gram positive aerobic, non-motile, non-spore forming bacilli represent the lowest isolated cases in the study 4 (1.53%) from all isolated cases. Its pattern of antibiotic sensitivity was as follows: Ampicillin 75%, Amoxicillin 75%, Nalidixic acid 75%, Ceftriaxone 25%, Sulfamethoxazole + Trimethoprim 50%, Cephalothin 100%, Ciprofloxacin 100%, Nitrofurantoin 100%, Chloramphenicol 0%, Doxycycline 75%. The antibiotic sensitivity patterns for all isolated pathogenic bacteria were as follows: Ampicillin 9.2%, Amoxicillin 70.2%, Nalidixic acid 60.3%, Ceftriaxone 61.8%, Sulfamethoxazole + Trimethoprim 26.3%, Cephalothin 35.5%, Ciprofloxacin 80.2%, Nitrofurantoin 64.5%, Chloramphenicol 43.1%, Doxycycline 26.3%.

Table (2): Pattern of antibiotic sensitivity among isolated organisms.

	ECOL I	KLEBS	STAP.A .	STAP. E	PSEUD.SP P	PRO.SP P	CORY N	ALL
Ampicillin	9.4	0	9.4	8.5	0	0	75	9.2
Amoxicillin	70.8	71.2	71.9	82.8	0	41.6	75	70.2
Nalidixic A	67.9	59.3	75	40	12.5	50	75	60.3
Ceftriaxone	73.6	67.8	40.6	42.8	25	66.6	25	61.8
Sulfa	25.5	20.3	15.6	27	100	50	50	26.3
cephalothin	21.7	20.3	53.1	83.8	0	16.6	100	35.5
Ciprofloxacin	85.5	71.2	75	81.1	87.5	75	100	80.2
Nitrofurantoin	71.7	52.5	62.5	78.4	0	66.6	100	64.5
Chlorampheni col	48.1	57.6	46.9	20	0	41.6	0	43.1
Doxycycline	21.7	25.4	37.5	31.4	12.5	25	75	26.3

Discussion

The present study showed that urinary tract infection is a major cause of morbidity especially in young children, 173 (66%) out of 262 cases showed growth on bacterial cultures, received during the six months period of study. In many studies, the majority of patients (46%) belonged to the 13 to 60 month age group and this coincides with studies from Zaire (Wammanda and, Ewa, 2002) ⁽⁹⁾, Turkey (Arselan et al., 1999) ⁽¹⁰⁾, Kuwait (Saleh et al., 2003) ⁽¹¹⁾, and Iran (Modarres and, Nassiri, 1997) ⁽¹²⁾. This could be because of the reason, as reported by other studies, that this age group of 13 - 60 months is more susceptible to infections due to their toilet training problems. The number of patients was less in the neonatal period and the cases increased with the increasing age and declined after the thirteen years of age till fifteen years ⁽¹³⁾. Trends in choice of antibiotic treatment may change depending on locally determined

resistances, common pathogens, and cost issues. In Al-Wahda therapeutic and teaching hospital, during 2021 and 2022 in the UTI patients we found that *E. Coli* was the most common pathogen 40.46% (106/262) and was most sensitive to Ciprofloxacin (85.8%) with noticeable resistance to Ampicillin (90.6% resistance). *Klebsiella* was the second most common pathogen 22.5% (59/262) against which Ciprofloxacin and Amoxicillin were most sensitive (71.2%) for both, with clear resistance to Ampicillin (100%) and Cephalothin (79.7%). *Staph epidermidis* was the third revealed pathogen 13.35% (35/262) against which Amoxycillin and Cephalothin (82.8%), (83.8%) respectively were most sensitive. *nStaph aureus* represented 12.21% (32/262) of cases, Nalidixic acid and Ciprofloxacin were the most sensitive 75% with clear resistance to Ampicillin (90.6%). *Enterococcus* 2.29% (6/262) of cases, Amoxycillin and Ceftriaxone were the most sensitive 100% while Doxycycline was resistance in all cases 100%. *Pseudomonas* 3.05% (8/262) of cases. Sulfamethoxazole + trimethoprim (Co-Trimoxazole) was most sensitive in all cases 100%, while Ampicillin, Amoxycillin, Cephalothin, Nitrofurantoin and Chloramphenicol were most resistance in all cases 100%. *Proteus* spp. represented 4.58% (12/262) of cases. Ciprofloxacin was sensitive in 75% of cases, while Ampicillin was resistant in all cases 100%. *Corynebacteria* was the least common organism seen in UTIs 1.6 % of cases (4/262). Cephalothin, Ciprofloxacin and Nitrofurantoin sensitivity were 100% in all cases, while Chloramphenicol was resistant in all cases 100%, Ceftriaxone was only sensitive in 75 % of cases. UTI and asymptomatic bacteriuria are common in the elderly, most often due to *Escherichia coli* (*E. coli*) colonization. For example, in one study the prevalence of bacteriuria in an elderly ambulatory population was 18 % in women and 6 % in men. The prevalence increases in women, with age and institutionalization⁽¹⁴⁾. The organisms infecting the urinary tract in this study were *E. coli* (71%), *Klebsiella pneumoniae* (13%), *Proteus* species (11%), *Staphylococcus* (4%), *Pseudomonas* (1%) in their descending order of percentages. These results are like many published articles (Waisman et al., 1999, Modarres and Nassiri, 1997). *E. coli* was found in 58,06% of the cases, *Clostridium perfringens*-9.67%, *Proteus*-3.22%, *Enterobacter*-3.22%, others-9.67%, association-16.12%, respectively, as expected in cases with many and/or prolonged periods of hospitalization.

In the present study, the most sensitive antibiotics to all isolated bacteria were Ciprofloxacin 80.2 % and Amoxycillin (70.2%), while Ampicillin was the least sensitive only in 9.2%, among all UTIs cases. Although many clinicians favor the use of Ampicillin or Co-amoxiclav, believing it will have a higher 'hit rate', we concluded that we should be using less Ampicillin and Co-amoxiclav for empirical treatment. We recommended the use of more Ciprofloxacin for empirical treatment, with three-day courses or Ceftriaxone in case of the parenteral route. Certain differences may change our treatment policies, such as the effect of antibiotic side effects, particularly relating to renal function, altered antibiotic resistances compared to younger populations. Again, few studies addressing these issues exist, and decisions are made anecdotally. The following antibiotics are the most sensitive antibiotics in all UTIs cases, firstly, Ciprofloxacin 80.2%, Amoxicillin 70.2%, Nitrofurantoin 64.5 %, and Ceftriaxone 61 %.

Conclusion

Urinary tract infection is a major cause of morbidity, especially in young children. Trends in choice of antibiotic treatment may change depending on locally determined resistances, common pathogens, and cost issues. In the notable absence of studies in the treatment of uncomplicated UTI we recommend empirical antimicrobial treatment based on local sensitivities which should be changed once the local pattern of sensitivities are known.

Recommendations

A follow up comparative study is recommended to compare the development of new resistant strains of the above cultured microorganisms to the list of antibiotics tested.

References

1. Mitchell, E. D., Murray, C. C., Meads, D., Minton, J., Wright, J., & Twiddy, M. (2017). Clinical and cost-effectiveness, safety and acceptability of community intravenous antibiotic service models: CIVAS systematic review. *Bmj Open*, 7(4), e013560.
2. Sanchez, G. V., Fleming-Dutra, K. E., Roberts, R. M., & Hicks, L. A. (2016). Core elements of outpatient antibiotic stewardship. *Morbidity and Mortality Weekly Report: Recommendations and Reports*, 65(6), 1-12.
3. Harbarth, S., Balkhy, H. H., Goossens, H., Jarlier, V., Kluytmans, J., Laxminarayan, R., ... & Pittet, D. (2015). Antimicrobial resistance: one world, one fight!.
4. Ibrahim, E. H., Sherman, G., Ward, S., Fraser, V. J., & Kollef, M. H. (2000). The influence of inadequate antimicrobial treatment of bloodstream infections on patient outcomes in the ICU setting. *Chest*, 118(1), 146-155.
5. National Collaborating Centre for Women's and Children's Health (UK. (2007). Urinary tract infection in children: diagnosis, treatment and long-term management.
6. Leung, A. K., Wong, A. H., Leung, A. A., & Hon, K. L. (2019). Urinary tract infection in children. *Recent patents on inflammation & allergy drug discovery*, 13(1), 2-18.
7. Jadresic, L., Cartwright, K., Cowie, N., Witcombe, B., & Stevens, D. (1993). Investigation of urinary tract infection in childhood. *British Medical Journal*, 307(6907), 761-764.
8. Klein, R. S. (1994). Criteria for the diagnosis of urinary tract infection. *Current Opinion in Nephrology and Hypertension*, 3(6), 652-655.
9. Wammanda R.D., Ewa B.O. Urinary tract pathogens and their sensitivity pattern in children. *Annals of Tropical Pediatrics* 2002;22:197-8.
10. Arslan S, Caksen H, Rastgeldi L, Uner A, Oner AF, Odabas D. Use of urinary gram stain for the detection of urinary tract infection in childhood. *Yale Journal of Biology and Medicine* 2002;75:73-8.
11. Saleh SI, Tuhmaz MM, Sarkhouh MY, El-Ghawabi MA. Urinary tract infection in children in Al-jahra area, Kuwait: An overview. *Kuw Med J* 2003;35(1):31-35.
12. Modarres S, Nassiri N. Bacterial etiologic agents of urinary tract infection in children in the Islamic Republic of Iran. *East Mediterr Health J* 1997;3(2):290-5.
13. Langley JM, Hanakowski M, Leblanc JC. Unique epidemiology of nasocomial urinary tract infection in children. *Am. J. Infect. Control* 2001;29:94-8.
14. Boscia JA, Kobasa WD, Knight RA et al. Epidemiology of bacteriuria in an elderly ambulatory population. *Am J Med* 1986; 80: 208-14.

Nutritional status among paediatric age group with chronic Renal failure undergoing hemodialysis.

Amal R. Agila^{1*} and Ambarka Eid.H Kreim^{2*}

Received 23 Nov 2023; Accepted 30 Dec 2023; published 10 Jan 2024

^{1*} Department of Biochemistry, Faculty of Medicine, Derna University, Derna, Libya. Email:

^{2*} Department of Nutrition, Faculty of Public Health, Benghazi University, Department of Public Health, Faculty of Medical Technology, Tripoli University, Tripoli, Libya.

Email: Ambarkakreim@gmail.com.

Corresponding Author*: Amal R. Agila amal_agela@yahoo.com.

Abstract

Objective was to evaluate the nutritional status of 23 children with chronic kidney disease receiving hemodialysis. Methodology: A structured interview questionnaire was designed and used to interview the child or mother. It includes nutritional assessment of the children under study, such as physical examination, anthropometric measurements, and laboratory investigations. Results: The current study found that 11 boys (47.8%) and 12 girls (52.2%), undergoing regular hemodialysis. Age ranged from 1 to 14 years. 73.9% had family history of hemodialysis, 95.7 % from the participants the duration of hemodialysis was 4 weeks and 73.9% from patients follow CKD and the majority of children under 90% of age and gender criteria had below normal weight, arm circumference, and triceps subcutaneous fat thickness and the average upper-to-lower body ratio was 1.1 and the average arm span-to-height ratio was 1, indicating proportional short stature in CKD Related to the clinical and laboratory characteristics of children with CKD. protein intake was significantly positively correlated with BUN, significantly negatively correlated with serum bicarbonate levels, the minimum albumin value was 3.0 mg/dl, and the maximum value was 7.1 mg/dl. Conclusion: In conclusion the age ranged from 1- 14 years, 73.9% of patients follow CKD and many children (90%) of children had below normal weight and the average albumin value was 3.0-7.1 mg/dl. Therefore, nutritional assessment should be based on multiple methods, the results of which should be synthesized by a pediatric nephrology team to comprehensively assess how dialysis start date is associated with lower anthropometric measurements with improving parental knowledge of nutritional dialysis is important.

KEYWORDS: nutritional assessment, children, hemodialysis, Tripoli.

1.INTRODUCTION

Patients starting dialysis have many benefits. First, dialysis acts as a second kidney, regulating blood pH, salinity, and blood pressure. These are all essential components of body fluids and must be kept in balance for the body to function properly. It is often tested when kidney function drops below 15% of that of a healthy kidney. This is because it is a lifeline for many renal failure patients. It is surprising to learn that

people who have been on dialysis for 6 months or more and then stop only live an average of 10 days. Hemodialysis and peritoneal dialysis are two different procedures. Nearly 90% of kidney disease patients receive hemodialysis, which is used by most patients (1).

Protein-calorie malnutrition in chronic kidney disease is a term used to describe the various metabolic and nutritional

problems caused by advanced renal disease and renal replacement therapy, which are commonly used in patients undergoing chronic hemodialysis. Protein energy wastage due to kidney disease has a significant impact on increased hospital admissions and mortality in dialysis patients. More than 600,000 people in the United States are currently being treated for end-stage renal disease, according to the latest Renal Data System Annual Report. Of these, 468,000 are on hemodialysis. End-stage renal disease is expected to increase by 5% each year in the United States (2).

Malnutrition in this patient group is the most responsible for its alarming morbidity and mortality. The degree of protein-calorie malnutrition is an important predictor of adverse outcomes in hemodialysis patients. Because of the magnitude of this problem, supplementing patients with adequate amounts of nutrients, including calories and protein, has inevitably become a step of choice for health professionals. is proven. Proper management of protein-calorie malnutrition involves a comprehensive combination of strategies that address both protein and energy malnutrition and take steps to prevent further depletion. Therefore, nutritional analysis should be detailed and should include monthly assessment of serum albumin, dry weight, and overall subjective assessment at 3- to 6-month intervals (3). Protein-energy malnutrition affects between 10% and 70% of patients with end-stage renal disease. In approximately 25% of hemodialysis patients, energy expenditure is less than 75% of the required dietary energy intake. Clinical symptoms appear only after malnutrition has progressed to a severe stage (3).

Because nutritional status affects a person's quality of life, it is imperative that the patient's nutritional status be rapidly improved in order to administer correct

nutritional therapy. Accurate evaluation is important (3,4).

End-stage renal disease (ESRD) patients undergoing maintenance hemodialysis are at risk of malnutrition, as shown by several cross-sectional studies worldwide. Longitudinal studies have shown that malnutrition is associated with reduced life expectancy, primarily due to cardiovascular and infectious complications. Several factors contribute to malnutrition in hemodialysis patients. Protein energy intake is often reduced due to inappropriate dietary restriction, anorexia, and altered taste, leading to malnutrition in most dialysis patients. contribute to confusion (4). Persistent catabolic states can result from chronic inflammatory states caused by acidosis, resistance to anabolic factors such as growth hormone, insulin, insulin-like growth factor-1, and the biocompatibility of dialysis membranes and fluids. I have. Also, nutrients such as glucose, amino acids, proteins, and vitamins are lost during dialysis treatment. Close monitoring of dietary intake is also mandatory in predialysis patients (5,6).

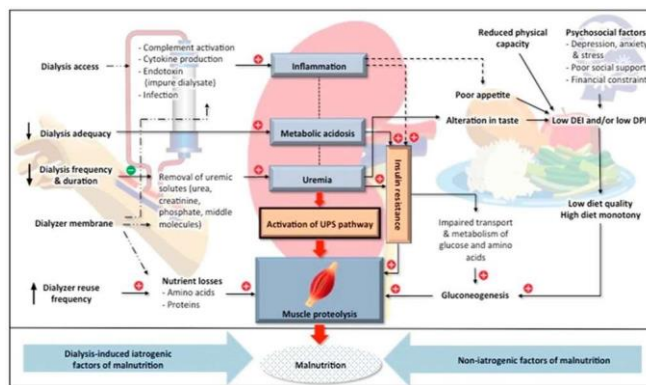


Figure 1: etiology of malnutrition in dialyzed patient.

Nutritional management is important to maintain dialysis stability (Figure 1). These patients need adequate intake of calories, protein, salt, sodium, potassium, phosphorus, and fluids.7 Providing nutritional support can

help hemodialysis patients live longer and perform better on dialysis. However, it can also be stressful for the patient. Many factors, such as lack of family support, changing preferences, and ignorance, make changing eating habits difficult in real life. 8,9 It is known that the long-term survival of hemodialysis patients is greatly affected by nutritional status (10).

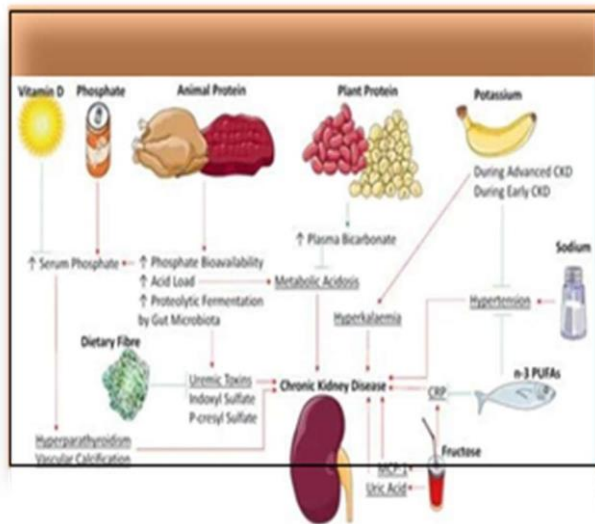


Figure2: management of malnutrition in hemodialyzed patients.

2-Patients and methods:

Study design:

retrospective, descriptive cross-sectional study.

Study setting:

This study was carried out in the Nephrology and Dialysis department at Tripoli University Hospital. Between January 2023 and August 2023.

Study period and population:

This study included 23 children who were retrospectively reviewed against the case records of the Department of Nephrology and Dialysis at Tripoli University Hospital from January 2023 and August 2023.

Study tool

The data was collected by reviewing medical records, by customized questionnaire has been created for the

study's purposes which included the following:

1. Demographic characteristics: age, gender, age at the initiation of HD, underlying causes of renal disease, HD duration.

2. Nutritional status of the hemodialyzed patients was evaluated by using

A. Biochemical measurements: records were reviewed for serum albumin, hemoglobin percentage, serum ferritin, Urea, Creatinine, Na, K, Ca, phosphorus, and vitamin D.

B. Anthropometric measurements.

➤ Weight and height were expressed in standard deviation score (SDS).

➤ Mid Arm Circumference (MAC) in cm, BMI (percentile), IBW and Ideal height to age.

C-Nutritional information; protein and calories intakes were calculated and expressed as a percentage of the recommended dietary allowance of protein and calories for CHD as recommended.

Data analysis

The collected data were sorted, coded then entered and analyzed using the spss, version24.0 statistical software. Descriptive statistics were used to summarize the outcome variables. Appropriate inferential statistics were performed with 0.05 chosen level of significance.

Literature review

A review study by Lesley Rees & Vanessa Shaw in UK, 2007. It was about nutrition in children with CRF and on dialysis. It was aimed to review the

methods of assessing nutritional status & to review the dietary requirements of normal children throughout childhood, including protein, energy, vitamins and minerals. Results, rate of growth gradually decreases from >25 cm/year at birth to an average of 18 cm/year at age 1 year and 10 cm/year by the age of 2. Half of adult height is achieved by the age of 2 years, so that irrecoverable loss of growth potential can occur during this phase. At birth, 170 kcal/day are stored in new tissue, falling to 50–60 at 6 months, 30–40 by 1 year and 20–30 by the age of 2 years (13).

Study was conducted by Moushira Erfan Zaki & Mona Mamdouh Hassan et.al in Egypt, 2012. It was about nutritional Status in Children with Chronic Renal Failure on Hemodialysis. This study aimed to evaluate the growth in relation to nutritional status in Egyptian children with CRF on hemodialysis. Results: Data shows that height was the most affected anthropometric parameter. Short stature in CRF is proportionate and body weight is less affected than height. Dietary analysis showed that 76.7 % of patients had recommended dietary allowance of calories. Height z-score showed a significant positive correlation with caloric intake. On the other hand, the protein intake showed a significant positive correlation with blood urea nitrogen and a significant negative correlation with serum bicarbonate (16).

Study conducted by Hanan Abdulqaium et.al. this study was about nutrition assessment and management in children on peritoneal dialysis in Nephrology and

dialysis unites in Tripoli University Hospital in Libya. This study aimed to discuss the main factors which affect the assessment and management of nutrition

status in children on peritoneal dialysis. Results, the total peritoneal dialyzed children regarding total 20 patients from 1st January 2021 to 31 of December 2021 in children on regular peritoneal dialysis in Nephrology and dialysis unite in Tripoli University Hospital in Libya, 65% male and 35% female. the prevalence of the weight to age z score is 61.7 % >-2SD for male, 85.7% >-2SD for female and 70% >-2SD for total. Where result of blood analysis of children on peritoneal dialysis shows as in table the 65% low hemoglobin (anemic), 85% low vitamin D, albumin was low in 25%, 56% of patient's low vitamin B12, 95% high creatinine, and 85% high urea, free 75% high and Iron 75% normal (7).

Another study by Maryam Mohammad in Egypt, 2020. It was about Assessment of Nutritional Status of Children with Chronic Renal Failure Undergoing Hemodialysis. It was aimed to assess the nutritional status of school age children with CRF under going hemodialysis. Results revealed that many studied children had height, weight, BMI, MAC, TSFT less than normal. Many children were anemic. Most children were low in vitamins such as A (93.3%), C (93.3%) and D (100%). 63.3 % of the studied children had hypoalbuminemia. high percent of children had hypocalcemia and hypokalemia. All studied children had hypercreatinemia (17).

RESULTS

This study included 23 children with chronic renal failure, 11 boys (47.8%) and 12 girls (52.2%), undergoing regular hemodialysis.

Age ranged from 1 to 14 years, with an average age of 10.5 years. 73.9% had family history of hemodialysis, 95.7 % from the participants the duration of hemodialysis was 4 weeks and 73.9% from patients follow CKD (table1 &2).

Table 1 presents the mean age and gender expressed as percentage.

Age	%	Sex	%
1-5 yr.	17.4	Male	47.4
5-10 yr.	8.7	Female	52.2
10-15 yr.	52.2		
15-20 yr.	21.7		

Table 2:

family history, duration of hemodialysis and follow CKD expressed as percentages.

Family History	%
Yes	73.9
No	26.1

Duration of hemodialysis	%
3/w	4.3%
4/w	95.7%

Follow CKD	%
Yes	26.1
No	73.9

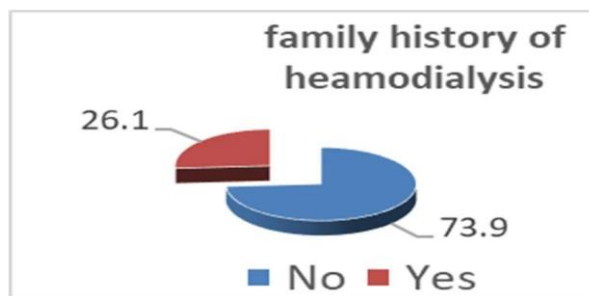


Figure3: Distribution of family history among Libyan children with CRF.

The mean of Age at onset of the disease was between 3.4-13.6 yr.) $SD \pm M (7.5 \pm 1.72)$, Duration of the disease (.9-5.6 yr., $SD \pm M 2.9 \pm 1.34$), Caloric intake % of RDA of calories (56.2-70 %, $SD \pm M 91.75 \pm 14.50$) and Proteins intake % of RDA of calories (9.60-75, $SD \pm M 139.23 \pm 23.07$) (table 3).

Table 3: The age at onset, duration, caloric and protein intake in children with CRF.

	Minimum	Maximum	$SD \pm Mean$
Age at onset of the disease (year)	3.4	13.5	7.5 ± 1.72
Duration of the disease (years)	0.9	5.6	2.9 ± 1.34
Caloric intake % of RDA of calories.	70.0	56.10	91.75 ± 14.50
Proteins intake % of RDA of calories	9.60	75.00	139.23 ± 23.07

Table 4 presents the clinical and laboratory characteristics of children with CKD. The minimum albumin value was 3.0 mg/dl and the maximum value was 7.1 mg/dl. Patients' creatinine levels ranged from 2.8 to 11.0, with a mean of 6.71 and mean phosphorus levels of 5.080 mg/dl and 2.20 to 7.50 mg/dl. ventually, the patient's sodium concentration ranged from 129 to 142 mg/dl.

Table 4: Clinical and laboratory characteristics of Libyan children with CRF.

Type of investigation	Mean	Minimum	Maximum
albumin	4.365	3.0	7.1
Creatinine	6.717	2.8	11.0
Phosphorus	5.0804	2.20	7.50
Hb	10.826	7.22	15.0
Na	137.00	129	142
K	4.791	3.7	5.9

In Table 5, Showed the relationship between disease duration, food intake and anthropometric measurements. The results showed that height was the most affected, as 83.3% of patients were short (z-height < -2) and z-height ranged from -0.6 to -7.1 with a mean of -3.66. showed. It is shown to be a measured parameter. In addition, the mean upper-to-lower body ratio was 1.1 and the mean arm span to height ratio was 1, indicating proportional short stature in CKD. Weight is less affected than height, as 46.7% of patients have a z-score for weight less than -2, with an average of -1.98. Mean z-scores for mean humeral circumference, triceps, and subscapular subcutaneous fat thickness decreased slightly. BMI and average upper arm circumference. Furthermore, a highly significant correlation was found between disease duration, height, and weight.

Table5: Correlations between disease duration, food intake, and anthropometric measurements in children with CKD

Age with Anthropometric. Measurements	Pearson Correlation	Sig. (2-tailed)
weight	.556**	0.006
Height	.463*	0.026
Mid arm circumference	0.258	0.235
BMI	0.275	0.205
IBW	.852**	0.000
Ideal height to age	.795**	0.000

	Duration of disease	Caloric intake	Protein intake
Ht z-score	-.632**	.367*	-0.23
Wt z-score	-.495*	0.683*	-0.3
BMI z-score	0.128	0.404	-0.27
Mid upper arm circumference z-score	-0.052	0.573*	-0.3
Triceps skin fold thickness z-score	0.246	0.187	-0.28
Subscapular skin fold thickness z-score	0.37	0.176	-0.22

In Table 6 & 7, protein intake was significantly positively correlated with Blood Urea Nitrogen (BUN), significantly negatively correlated with serum bicarbonate levels, and serum albumin and phosphate levels were significantly positively correlated with duration of hemodialysis, respectively. There was a correlation (p-value = 0.044, 0.043).

Table 6: Correlations between age and anthropometric measurements in children with CR

Table 7: Relationship between duration of hemodialysis with amount of pro., albumin, creatinine in Libyan children with CRF.

D. of H. with albumin & phosphorous		Sum of Squares	Mean Square	F	Sig.
albumin	Between Groups	2.794	2.794	4.570	.044
	Within Groups	12.838	.611		
	Total	15.632			
phosphorus	Between Groups	11.962	11.962	2.650	0.043
	Within Groups	94.791	4.514		
	Total	106.753			

DISCUSSION

The present work demonstrates that height is the most severely affected anthropometric parameter in children with CRF on dialysis. Our results agree with those of another Egyptian study done on 23 Libyan children with age range of 1-14 years which reported that the mean height z- score was -3.7 in Libyan children with CRF. On the other hand, data from developed countries generally show less severe height affection. The data on growth of 2,329 children in the North American Pediatric Renal Transplant Cooperative Study (NAPRTCS), showed that 36.6%, 47.0%, and 43.0% of children with chronic renal insufficiency (CRI), dialysis, and transplantation, respectively, have short stature, and the mean height z- score were -2.54, -1.95, and -1.67 for children aged 0 to 1 years, 2 to 5 years and 6 to 12 years, respectively (17).

Related to the clinical and laboratory characteristics of children with CKD. The minimum albumin value was 3.0 mg/dl and the maximum value was 7.1 mg/dl. Patients' creatinine levels ranged from 2.8 to 11.0, with a mean of 6.71 and mean phosphorus levels of 5.080 mg/dl and 2.20 to 7.50 mg/dl. Eventually, the patient's sodium concentration ranged from 129 to 142 mg/dl.

In the present study, the average upper-to-lower body ratio was 1.1 and the average arm span-to-height ratio was 1, indicating proportional short

stature in CKD. This is consistent with another study that found that children with severe

developmental delay due to CRF maintained normal physique despite the chronic condition (18). In contrast to another study, CKD patients had a lower trunk-to-limb length ratio, suggesting a disproportionate effect of disease and/or treatment on spine growth (19). In the current study, weight is less affected than height. This is consistent with other studies that found no significant weight loss in children with CKD (20). The mean brachial girth z-score of the triceps brachial and the thickness of the subscapular skin fold were also slightly reduced. Mild to moderate deficits in triceps skin thickness have been reported in children with chronic kidney disease (21).

The current study found that the majority of children under 90% of age and gender criteria had below normal weight, arm circumference, and triceps subcutaneous fat thickness (Table 1). Four). This is in partial agreement with Zaki et al. (2012) found that height was the most affected anthropometric parameter in CKD children on dialysis, whereas weight was less affected (26). Further, the North American Pediatric Kidney Transplant Cooperative Study (NAPRTCS) found that 36.6%, 47.0%, and 43.0% of children with chronic kidney disease dialysis, or a transplant are short (32). Both the mean upper-to-lower body ratio and the mean arm span-to-height ratio in the current study showed that short stature in CKD is proportional. This is in line with another study that found that even her severely CKD-related stunted children maintained proper body shape. In contrast, another study found that CKD patients had a lower trunk-to-limb ratio. This may indicate that a disease or treatment has a disproportionate impact on spine growth. In current research, weight is less important than height. This is consistent with other studies that have not shown a significant reduction in body weight in children with CH. In addition, there was a slight decrease in subscapular subcutaneous fat width and mean brachial circumference Z-score for triceps brachial. Children with CKD have been found to have mild to moderate impairments in triceps skin

fold thickness (20),19. Clinical practice guidelines for nutrition in chronic renal failure published by the Kidney Disease Outcome Quality Initiative (K/DOQI) emphasize that no single index can provide a complete picture of nutritional status. As a result, a wide range of interventions are suggested, and medical staff combine the results to provide an insightful analysis of nutritional status (29). Since there is no evidence that children requiring dialysis require higher RDAs than healthy children, the initial prescribed energy intake for children

receiving hemodialysis or maintenance

peritoneal dialysis therapy should be within the chronological age recommendation of 1. It must be at the level of the Daily Allowance (RDA) (12).

Adjustments should then be made based on the child's reaction. Secondary causes of inadequate food intake in children with chronic kidney disease include anorexia, altered taste, nausea, vomiting, emotional distress, underlying medical conditions, unappealing prescription diets, and diets due to socioeconomic status. There are restrictions. In the current study, patient caloric intake ranged from 56-70% of their RDA, with an average of 91.7%. Only 23.3% of patients had adequate energy intake above 100% of their Recommended Daily Allowance, while the rest (76.7%) of patients had 100% of their Recommended Daily Allowance. had a calorie intake greater than 70% of the recommended daily allowance, despite being less than 96.7% of people ate enough protein and exceeded the 100% RDA, while the remaining 3.3% consumed less protein than recommended. nutrition, and the prevention of chronic non- communicable diseases, diets should be changed compared to nutrition in healthy children (23).

CONCLUSION

In conclusion, the age ranged from 1- 14 years,73.9% of patients follow CKD and the majority of children (90%) of children had

below normal weight and the average albumin value was 3.0-7.1 mg/dl. Therefore, nutritional assessment should be based on multiple methods, the results of which should be synthesized by a pediatric nephrology team to comprehensively assess how dialysis start date is associated with lower anthropometric measurements with improving parental knowledge of nutritional dialysis is important.

RECOMMENDATIONS

- 1-The 1-PKD Foundation gives specific daily recommendations of 1.2 -1.4 g/day from protein.
- 2- potassium-restricted diet 40–120 mg/kg/day for infants and younger children and 30–40 mg/kg/day for older children.
- 3- folic acid and vitamin B12 should be to as part of a standard water-soluble vitamin supplement of pediatric dialysis patients.
- 4- Patients and their families should consult a dietitian when starting dialysis.

ACKNOWLEDGEMENT

The source of financial support must be acknowledged. Authors must declare any financial support or relationships that may pose conflict of interest in the covering letter submitted with the manuscript. Technical assistance may also be acknowledged.

ETHICS

Authors may need to address any ethical issues that may arise after the publication of this manuscript.

REFERENCES

- 1-Blumberg Benyamini S, Katzir Z, Biro A, Cernes R, Shalev B, Chaimy T, Barnea Z. Nutrition assessment and risk prediction in dialysis patients-a new integrative score. *J Ren Nutr.* 2014;24:401–410.
- 2-Edefonti A, Mastrangelo A, Paglialonga F. Assessment and monitoring of nutrition status in pediatric peritoneal dialysis

- patients. *Perit Dial Int* 2009;29:176–9.
- 3-Elshafie AM, Bahbah MH, Elnemr FM, et al. Effect of omega-3 supplementation on lipid profile and inflammatory markers in children on chronic hemodialysis. *Menoufia Med J* 2016;29:265
- 4-Goodkin, D. A., Bragg-Gresham, J. L., Koenig, K. G., Wolfe, R. A., Akiba, T., Andreucci, V. E., ... & Held, P. J. (2003). Association of comorbid conditions and mortality in hemodialysis patients in Europe, Japan, and the United States: The Dialysis Outcomes and Practice Patterns Study (DOPPS). *Journal of the American Society of Nephrology*, 14(12), 3270-3277.
- 5-Hou Y, Li X, Hong D, et al. Comparison of different as-assessments for evaluating malnutrition in Chinese patients with end-stage renal disease with maintenance hemodialysis-sis. *Nutr Res* 2012; 32:266–271. Doi: 10.1016/j.nutres.2012.02.006.
- 6- Hurley, K.M.; Yousafzai, A.K.; Lopez-Boo, F. Early Child Development and Nutrition: A Review of the Benefits and Challenges of Implementing Integrated Interventions. *Adv. Nutr.* 2016, 7, 357–363. [CrossRef]
- 7- Hanan Abdulqaium et.al. Nutrition assessment and management in children on peritoneal dialysis in Nephrology and dialysis unite in Tripoli University Hospital in Libya. *Journal of the Arab Board of Health Specializations A Medical Journal Encompassing all Health Specializations Issued Quarterly SELECTED ABSTRACTS CONTENTS JABHS Vol. 18, No. 3, 2017.*
- 8-Ikizler TA, Cano NJ, Franch H, Fouque D, Himmelfarb J, Kalantar-Zadeh K, Kuhlmann MK, Stenvinkel P, TerWee P, Teta D, Wang AY, Wanner C International Society of Renal Nutrition and Metabolism. Prevention and treatment of protein energy wasting in chronic kidney disease patients: a consensus statement by the International Society of Renal Nutrition and Metabolism. *Kidney Int.* 2013;84:1096–1107.
- 9-Kovesdy, C.P.; Kopple, J.D.; Kalantar-Zadeh, K. Management of protein-energy wasting in non-dialysis-dependent chronic kidney disease: Reconciling low protein intake with nutritional therapy. *Am. J. Clin. Nutr.* 2013, 97, 1163–1177. [CrossRef] [PubMed]
- 10-Kulkarni MJ, Jamale T, Hase NK, et al. A cross-sectional study of dialysis practice- patterns in patients with chronic kidney disease on maintenance hemodialysis. *Saudi J Kidney Dis Transpl* 2015;26:1050-6.
- 11-Kim H, Lim H, Choue R. A better diet quality is attributable to adequate energy intake in hemodialysis patients. *Clin NutrRes.* 2015;4:46–55.
- 12-Kang SS, Chang JW, Park Y. Nutritional status predicts 10-year mortality in patients with end-stage renal disease on hemodialysis. *Nutrients.* 2017;9:e399.
- 13-Lesley Rees & Vanessa Shaw. Nutrition in children with CRF and on dialysis. *Pediatric Nephrol* (2007) 22:1689–1702 DOI 10.1007/s00467-006-0279-z.
- 14-ŁukaszykE., ŁukaszykM., Koc-ŻórawskaE.. Iron status and inflammation in early stages of chronic kidney disease. *Kidney Blood Press Res.* 2015; 40(4): 366–373
- 15-Lotfy HM, Sabry SM, Ghobrial EE, Abed SA. The effect of regular hemodialysis on the nutritional status of children with end-stage renal disease. *Saudi J Kidney Dis Transpl* 2015;26:263–70.
- 16-Moushira Erfan Zaki & Mona Mamdouh Hassan et.al in Egypt, Nutritional Status in Children with Chronic Renal Failure on Hemodialysis *Macedonian Journal of Medical Sciences.* 2012 Oct15;5(3):296-301. <http://dx.doi.org/10.3889/MJMS.1857-5773.2012.0234> *Clinical Science.*
- 17- Maryam Mohammad. Assessment of Nutritional Status of Children with Chronic Renal Failure Undergoing Hemodialysis.

Tanta Scientific Nursing Journal · February 2020 DOI: 10.21608/tsnj.2020.74532.

18-National Kidney Foundation. Kidney Disease Outcome Quality Initiative (NKF- K/DOQI) Clinical practice guideline for nutrition in CRF. *Am J Kidney Dis* 2000;35 (Suppl 2):S1-40.

19-National Kidney Foundation Kidney Disease Outcomes Quality Initiative. KDOQI clinical practice guideline for nutrition in children with CKD: 2008. *Am J Kidney Dis.* 2009; 53(3): S1– S124.

20-Nazar CM, Anderson J. Extent of malnutrition in end-stage renal disease patients. *J Nephropharmacol.* 2014;3:27–28.

21-Nutrition for Your Child on Peritoneal Dialysis. Available online:

<https://www.niddk.nih.gov/healthinformation/kidney-disease/children/caring-child-kidney-disease/nutrition-chronic-kidney-disease#nutrition> (accessed on 18 April 2020).

22-Pupim LB, Cuppari L. Malnutrition in end-stage renal disease: beyond inadequate nutrient intake. *Nephrol News Issues.* 2003;17:66–71.

Pisoni RL, Bragg-Gresham JL, Young EW, et al. Anemia management and outcomes from 12 countries in the dialysis outcomes and practice patterns study (DOPPS). *Am J Kidney Dis* 2004;44:94-111.

23-Santos NS, Draibe SA, Kamimura MA, Canziani ME, Cendoroglo M, Junior AG, Cuppari L. Is serum albumin a marker of nutritional status in hemodialysis patients without evidence of inflammation? *Artificial Organs.*2003;27(8):681-686.

24-Souza RA, Oliveira EA, Silva JM, Lima EM. Hemodialysis vascular access in children and adolescents: A ten-year retrospective cohort study. *J Bras Nefrol* 2011;33:422-30.

25-S. A. Abed, “Assessment of the Nutritional Status of Pediatric Patients on Regular Hemodialysis by Lecturer of Pediatrics”. Shapiro BB, Bross R,

Morrison G, Kalantar-Zadeh K, Kopple JD. Self-reported interview-assisted diet records underreport energy intake in maintenance hemodialysis patients. *J Ren Nutr.* 2015;25:357–363.

26-Satirapoj, B.; Limwannata, P.; Kleebchaiyaphum, C.; Prapakorn, J.; Yatinan, U.; Chotsriluecha, S.; Supasyndh, O. Nutritional status among peritoneal dialysis patients after oral supplement with ONCE dialyze formula. *Int. J. Nephrol. Renov. Dis.* 2017, 10, 145–151. [CrossRef] [PubMed].

27-Wong CS, Gipson DS, Gillen DL, Emerson S, Koepsell T, Sherrard DJ, Watkins SL, Stehman-Breen C (2000) Anthropometric measures and risk of death in children with end-stage renal disease. *Am J Kidney Dis* 36:811.

28- Walters, B. A., Hays, R. D., Spritzer, K. L., Fridman, M., & Carter, W. B. (2002). Health-related quality of life, depressive symptoms, anemia, and malnutrition at hemodialysis initiation. *American Journal of Kidney Diseases,* 40(6), 1185-1194.

29- Wingen AM and Mehls O (2020). Nutrition in children with preterminal chronic renal failure. Myth or important therapeutic aid? *Pediatric Nephrol;* 17:111–120

30--ZaritskyJ., YoungB., WangH.J.. Hepcidin—a potential novel biomarker for iron status in chronic kidney disease. *Clin J Am Soc Nephrol.* 2009; 4(6): 1051–1056.

Depression among Patients Undergoing Maintenance Hemodialysis at a Nephrology Department in Benghazi Medical Center, Libya.

Zinelabedin Mohamed¹, Alqasim Abdulkarim¹, Kathloun Elkaseh², Naeima Mukhtar El Tikali², Mahmoud M M Alashqar², Nael A E Qudaih², Sarah Muftah Younis³, Khalil A K Tamoos⁴, Eman F A Altarhouni⁵.

¹Department of Internal Medicine, Faculty of Medicine, Tobruk University, Tobruk, Libya.

²Department of Internal Medicine, Benghazi Medical Center, Benghazi, Libya.

³Faculty of Medicine, Libyan International Medical University, Benghazi, Libya

⁴Department of General Surgery, Al-Jalaa hospital, Benghazi, Libya.

⁵Pediatric department, Faculty of Medicine, Tobruk University, Tobruk, Libya.

Received 28 Oct 2023; Accepted 06 Jan 2024; published 10 Jan 2024

*Correspondence: Zinelabedin Mohamed; Zen_zen47@yahoo.com

Abstract

Background: The number of End Stage Kidney Disease (ESKD) patients living on Kidney Replacement Therapy (KRT) is increasing globally. Hemodialysis is the most prevalent KRT worldwide. Patients with ESKD in general, and especially those on hemodialysis, are affected by an increased incidence of mental, cognitive, and psychological dysfunction-related issues, of these issues, depression has the highest burden, with its detrimental impact on the general health of patients, aggravating malnutrition, decreasing compliance to treatment, adding increased stress on their caregivers, and increasing morbidity and mortality. This study analyzed the occurrence of depression in patients with chronic kidney disease (CKD) undergoing hemodialysis (HD) at Benghazi Medical Center (BMC) in Benghazi, Libya. **Methods:** A cross-sectional study investigating the prevalence of depression among hemodialysis patients attending the nephrology department at Benghazi Medical Center, Benghazi, Libya, and its relation to some common socio-demographic factors, using Beck's Depression Inventory scale for depression conducted in September. **Results:** Forty-six (46) patients were included, the mean age of the patients was 48 ± 14.3 years, with 28 (60.9%) male patients and 18 (39.1%) female patients; depression was observed in 22 (47.8%) patients, mean BDI score was 11.7 ± 9.39 ; ranging from 0 to 43, female patients had a higher median score of 13 ranging from 1 to 43, male patients median score was 8 ranging from 0 to 25, illiterate patients had a median score of 25; ranging from 12 to 35, educated patients median was 8 ranging from 0 to 43. **Conclusions:** Depression was common in patients undergoing HD, and the rate of depression was significantly higher in female and illiterate patients.

Keywords: End-Stage Kidney Disease, Depression, Hemodialysis, Benghazi, Libya

Abbreviations:

ESKD: End Stage Kidney Disease, KRT: Kidney Replacement Therapy, HD: Hemodialysis, CKD: Chronic kidney disease, WHO: World Health Organization, BDI: Beck Depression Inventory, BMC: Benghazi Medical Center, SPSS: Statistical Package for the Social Sciences.

Introduction

End Stage Kidney Disease (ESKD) is a common worldwide morbidity, with an increasing incidence rate of patients undergoing Kidney Replacement Therapy (KRT) [1]. Globally, the number of patients who underwent KRT in 2010 is estimated to be about three million patients, and this number is expected to increase to reach a prevalence of about 5 to 10 million in 2030 [2]. Hemodialysis (HD) is the most common type of KRT used worldwide [3]. ESKD can lead to many physical and psychological burdens once it develops, and patients on HD are at a significantly increased risk of mental disabilities, including depression, anxiety, fatigue, and decreased quality of life compared to other treatment modalities [4]. The World Health Organization (WHO) defines depression as "a common mental disorder characterized by sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, feeling of tiredness, and poor concentration" [5]. Unfortunately, depression frequently goes undiagnosed among patients undergoing hemodialysis (HD), contributing to suboptimal compliance with dialysis therapy. Consequently, inadequate adherence to the prescribed treatment regimen can result in insufficient dialysis, leading to heightened uremia, exacerbation of the underlying condition, and an escalation in the severity of depression. These cascading effects can further manifest as impaired nutritional balance, reduced self-esteem, and an augmented propensity for suicidal ideation [6]. There are several tools for screening depression, but few of these tools have been validated in chronic kidney disease (CKD) and dialysis patients, one of these validated tools is the Beck Depression Inventory (BDI) scale, which is a self-rated tool which is used to identify depression symptoms and measure the intensity of depression, manifested through the person's behavior and perspectives, consisting of 21 questions, surveying both mental and somatic symptoms of depression, graded from 0 to 3 for each question, the total score is ranging from 0 to 63 [7]. The usefulness of the BDI scale tool for screening depression is due to its relatively easy administration, and patients with ESKD on HD had a significantly high BDI score [8], which was shown to be associated with aggravated morbidity and mortality in HD patients [9]. Unlike high-income and well-developed countries, the problem of depression has not been well studied in less developed countries like Libya, and there is scarce data regarding the prevalence of depression and its risk factors both in the general population and in special high-risk groups, such as patients with ESKD. This study aimed to estimate the prevalence of depression in patients with CKD undergoing HD at the Benghazi Medical Center (BMC) in Benghazi, Libya, to assess the sociodemographic and clinical characteristics associated with depression among HD patients, and to help identify modifiable factors associated with depression among Libyan hemodialysis patients.

Methods

This was an observational cross-sectional descriptive study of patients on maintenance HD at the Nephrology Department in Benghazi Medical Center (BMC), conducted over 30 days in September 2019, after ethical clearance from the Research Ethics Committee of Benghazi Medical Center. The STROBE cross-sectional reporting guideline checklist was used to validate the consistency of the study. Patients who had received at least three months of maintenance HD, aged eighteen (18) years and above, of both sexes were asked to provide informed consent for inclusion in the study. Fifty HD patients were recruited in the study period, patients who had previous documentation of clinical dementia or cognitive impairment, acutely ill patients, and patients who declined or were unable to provide informed consent; were excluded, the final sample size was forty-six (46) patients. The total number of HD patients was 50 HD patients recruited for participation, of whom four patients were excluded due to non-illegibility; thus, the final number of enrolled patients was 46. Data were collected by trained investigators, and it consisted of multiple parts:

- Patient demographic characteristics included questions about age, gender, level of education, employment status, and marital status.
- Clinical data obtained from the patients' records, about history and their disease and comorbidities, which include frequency and duration of dialysis per week, duration of renal failure, years of undergoing HD, smoking status, exercise, and present comorbidities (such as hypertension, diabetes mellitus, ischemic heart diseases).
- The Beck Depression Inventory (BDI) scale score, obtained through a self-administered validated Arabic translation of the BDI-II questionnaire [10], was filled directly by patients or through a helper who reads aloud and explains the questions to the patient who would choose his answer; we used the score cutoffs of: (a) no depression for a score from zero to 9, (b) mild depression for a score from 10 to 15, (c) moderate depression for a score from 16 to 23, and a score of 24 or more indicates (d) severe depression [7].
- The choice of cutoff score in the BDI scale has implications for identifying individuals with depressive symptoms. Using slightly higher cutoffs, such as those recommended in the revised version of the BDI scale (BDI-II), or considering the variability observed in different studies can help address inconsistencies and improve comparability across research [7].

Ethical statement

This research study was approved by the Benghazi Medical Center Research Ethics Board (ID: 2019.45.44.1, date of approval: 08/06/2019). All participants provided informed consent before participating in the study. The study was conducted in accordance with all applicable ethical standards.

Statistical analysis

Statistical analysis was done by Statistical Package for the Social Sciences (SPSS) v23 (IBM Corp 2015, Armonk, NY: IBM), quantitative data was expressed as the mean \pm SD & median, qualitative data was expressed as absolute frequencies & relative frequencies, and Continuous data had been checked for normality by using the Shapiro Wilk test, Mann Whitney U test was used to compare two groups of non-normally distributed variables, Spearman's rank correlation coefficient was calculated to assess the relationship between different study variables, (+) sign point out direct correlation & (-) sign point out inverse correlation, additionally, values near to 1 point out strong correlation & values near zero point out weak correlation, All tests had been two-sided, p-value $<$ 0.05 was regarded statistically significant (S) and p-value \geq 0.05 was regarded statistically insignificant.

Results

The study enrolled a total of 46 patients, with an average age of 48 years (\pm 14.3). The age range of the patients varied from 21 to 90 years. Among the enrolled patients, 28 (60.9%) were male, and 18 (39.1%) were female. In terms of marital status, the majority of patients, 25 (54.3%), were married, while 21 (45.7%) were single. Regarding education level, 4 patients (8.7%) were illiterate, 3 patients (6.5%) had completed primary education, 12 (26.2%) had finished preparatory and secondary education, and 15 (23.6%) were college graduates. In terms of employment status, 31 (67.4%) were unemployed, while 15 (32.6%) were employed. Additionally, 15.2% of the patients were smokers, 63% had hypertension, and 15.2% had diabetes mellitus (Table 1), The median duration of Hemodialysis among the studied patients was six years (ranged from 1 to 27 years). Depression was present in 22 (47.8%) of the patients to some degree, while it was not observed in 24 (52.2%) patients, as shown in Table 2 and Figure 1. The average score on the Beck Depression Inventory (BDI) was 11.7 (\pm 9.39), ranging

from zero to 43. Female patients had higher depression scores, with a median score of 13 (ranging from one to 43), compared to male patients who had a median score of eight (ranging from zero to 25). This difference was statistically significant ($p < 0.05$). Additionally, illiterate patients had higher depression scores, with a median score of 25 (ranging from 12 to 35), compared to educated patients who had a median score of eight (ranging from zero to 43). This difference was also statistically significant ($p < 0.05$) (Table 3). Nevertheless, there was no statistically significant difference among other socio-demographic parameters, smoking, and comorbidities (diabetes, hypertension) and laboratory data (Hb, Blood glucose, Urea, Creatinine, S-Albumin, calcium, phosphate) and hemodialysis-related parameters of the studied patients, and their depression score; $p > 0.05$. Figure 1: Flow chart on enrollment of studied population.

Table (1) Distribution of the studied patients according to demographic characteristics (n=46):

	no	%
Age per year		
20 - ≤ 40	15	(32.6)
41-60	23	(50.0)
61-90	8	(17.4)
Mean± SD	48±14.3	
Range	(21-90)	
Gender		
Female	18	39.1
Male	28	60.9
Education		
illiterate	4	8.7
Primary	3	6.5
Preparatory	12	26.1
Secondary	12	26.1
Collage	15	32.6
Job		
employed	15	32.6
Not employed	31	67.4
Marital status		
Married	25	54.3
single	21	45.7
Smoking Habit		
Non-smokers	39	84.8
Smokers	7	15.2
Diabetes mellitus		
No	39	84.8
Yes	7	15.2
Hypertension		
No	17	37.0
Yes	29	63.0
Other co-morbidities		
No	38	82.6
Limb -amputation	1	2.2
CMP	1	2.2
Hiatus hernia	1	2.2
IHD	3	6.5
MR	1	2.2
SLE	1	2.2

CMP: Cardiomyopathy, IHD: Ischemic Heart Disease., MR: mitral regurgitation, SLE: systemic lupus erythematosus.

Table (2) Prevalence of depression among the studied patients and their grades and scores (n=46):

	No.	%
Depression grade Studied patients (n=46)		
No Depression	24	52.2
With depression		
Mild	11	23.9
Moderate	5	10.9
Severe	6	13.0
Total:	46	100%

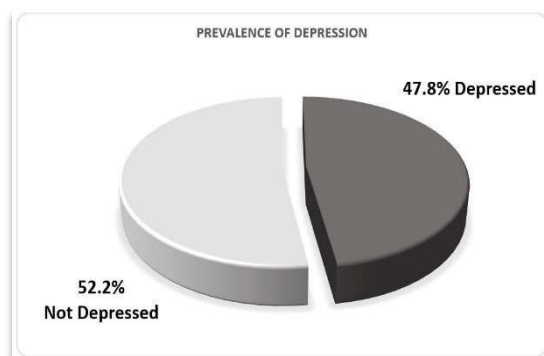


Figure 1: Prevalence of depression among the studied patients

Table (3) Relationship between sociodemographic, smoking, and comorbidities of the studied patients and their depression score:

Variables	Mean BDI ± SD	Median(range)	U-test	p-value
SEX				
Female	15.72±11.89	13(1-43)	1.93	0.049(S)
Male	9.11±6.35	8(0-25)		
Education				
Illiterate	24.5±9.5	25(12-35)	2.5	0.012(S)
Educated	10.48±8.5	8(0-43)		
Job				
Un- employed	13.39±10.5	11(1-43)	1.41	0.16
Employed	8.2±5	7(0-18)		
Marital status				
Single	12.19±8.8	9(3-35)	0.64	0.52
Married	11.28±10	8(0-43)		
Smoking				
Yes	7.71±3	8(4-12)	0.96	0.33
No	12.4±9.97	10(0-43)		
Diabetes mellitus				
Yes	15.29±8	13(4-25)	1.59	0.11
No	11±9.6	8(0-43)		
Hypertension				
Yes	11.59±7.86	11(0-30)	0.78	0.44
No	11.88±11.83	7(1-43)		

U-Test= Mann-Whitney U test S=significant p<0.05.

Discussion

In this study, it was found that 47.8% of the patients experienced some level of depression. This finding is consistent with the results of several international studies that utilized self-administered or clinician-administered scoring tools, such as the BDI score. For instance, rates of depression in dialyzed patients were reported as 51.8%, 49%, 56.5%, and 42.7% in Nepal, the USA, Korea, and Brazil, respectively [11-14]. Moreover, In a meta-analysis conducted by Palmer et al, which included 87 studies using the BDI as a screening tool, depression was observed in 41.3% (CI, 37.9–44.7) of the surveyed population, consisting of 9384 subjects [15].

In the present study, it was found that the mean BDI score of the studied patients was 11.7 with a range of (0-43), In line with results from Western world countries, Wuerth et al. and Cukor et al. reported that the mean BDI score was 12.1 ± 7.7 and 12.1 ± 9.8 respectively in dialysis patients from USA [13,16], Ibrahim et al. from Egypt reported that the mean BDI score in Egyptian hemodialysis [17], However, in eastern world countries the average BDI score reported is seen to be higher; Manandhar et al. from Nepal reported mean BDI score of 19.2 ± 10.2 [11], results from Pakistani and Turkish HD patients reported by Saeed Z. et al. and Bulut et al. showed a mean BDI score 25.4 ± 11.4 and 27.9 ± 11.7 respectively [18,19], while KOO et al from Korea reported Mean BDI score of 22.7 ± 11.4 [13], these differences in BDI scores between Western and Eastern world countries can be justified by the different perceptions of the BDI questionnaire between these different populations, and the influence of the diverse cultural, demographic, and socioeconomic factors that may interfere with symptoms of depression. It is worth noting that the BDI score is a self-rated tool in which the individual rates their own level of depressive symptoms. This means that it cannot be used as a standalone diagnostic tool for depression. To make an accurate diagnosis, more robust clinical tools like the Diagnostic and Statistical Manual of Mental Disorders (DSM) criteria should be applied. These criteria involve qualified experts assessing the presence of depression while minimizing the influence of somatic symptoms on the survey. When using self-rated tools like the BDI, there is a concern regarding the overlap of somatic symptoms associated with ESKD, such as fatigue, impaired sleep, and anorexia, with symptoms attributed to depression in the BDI questionnaire. This can lead to an overestimation of depressive symptoms and, consequently, a higher observed rate of depression. In a meta-analysis of 41 studies conducted by Palmer S et al., it was found that depression was reported in 39% of dialysis patients when using both self-rated and clinician-administered survey tools. However, when utilizing diagnostic tools that employ structured clinical interviewing, like the DSM criteria, the observed prevalence rate of depression was nearly halved, with only approximately 22.8% (CI, 18.6–27.6) of subjects being diagnosed with depression. This difference does not appear to be related to demographic or general socioeconomic characteristics of the studied population [15]. Accordingly, expert guidelines state that patients who screen positive for depression using self-administered tools should be evaluated using structured interviewing tools to identify patients who may need active intervention to alleviate depression. Consequently, some expert authors have suggested a cutoff BDI score of 14 to 16 or above as the most reliable for selecting KRT patients who should be referred for further psychological evaluation and management [20]. Hence, in the literature, different BDI score cutoffs have been used to determine the degree of depression, while some authors use the standard BDI cutoff, as in this study, others adopt slightly higher cutoffs, such as those who use the revised version of the BDI scale (BDI-II), therefore, they report relatively lower rates of depression. This fact should be taken into consideration when comparing the results of different studies that use the BDI scale. The impact of socioeconomic factors on depression in hemodialysis patients is a complex and multifaceted issue. In our study, we did not find a statistically significant relationship between depression and socio-demographic characteristics such as age group, occupation, and marital status. This finding is consistent with previous research conducted in Egypt, Turkey, Sudan, and Iraq [21-24], which also reported no significant association between these factors and depression in hemodialysis patients. Similarly, we did not observe a significant relationship between depression and clinical data such as smoking, diabetes, hypertension, laboratory data, and hemodialysis-related parameters. These findings align with previous studies conducted in the same regions, suggesting that these factors may not directly contribute to the development or severity of depression in hemodialysis patients. Interestingly, employment status did not have a significant influence on the rate of depression in our studied population. This contrasts with a report from Nepal by Manandhar et al., which indicated a positive relationship between unemployment and an increased rate of depression in Nepalese hemodialysis patients [11]. The difference in findings may be attributed to variations in socio-economic factors and the level

of governmental support in these populations. It is possible that the availability of social welfare programs, job opportunities, and financial support in different countries can influence the impact of employment status on depression in hemodialysis patients. Regarding gender, male sex was the most predominant in our study, with 60.9% of the included patients being males and 39.1% being females. This finding is consistent with the reported higher prevalence of ESKD among males in Libya [25]. However, despite the higher prevalence of ESKD among males, the depression score was higher among female patients. This finding is consistent with studies conducted in Iraq and other international settings, which have consistently reported higher rates of depression among female hemodialysis patients [24]. This observation may be attributed to gender differences in the willingness to express emotions. Females tend to be more open in expressing their emotions, while males may be more restrained in disclosing or expressing their emotional distress [26]. However, there are other studies in which no gender-specific difference in the rate of depression in HD patients was observed [14]. This contradiction can be attributed to the different perspectives and socio-economic factors within each population. In the present study, depression scores were higher among illiterate patients than among educated patients, which is consistent with another similar study conducted in Turkey by Oner N. This confirms the evidence for the negative impact of illiteracy on health by decreasing awareness of patients regarding their disease, poor communication with healthcare providers, and impaired compliance with treatments. This underscores the need for effective measures to eliminate health illiteracy to improve outcomes in HD patients. Furthermore, the current study showed that there was no significant relationship between higher depression scores and the marital status of patients ($p = 0.119$). However, according to Armaly et al., unmarried patients were two times more likely to be depressed than married ones. In contrast, a study in Saudi Arabia concluded that married patients were more depressed than single patients. This contradiction is difficult to resolve due to the complex socio-demographic, cultural, and behavioral differences between these different populations. Finally, it should be noted that this study had a relatively small sample size, which is a common characteristic of many international studies examining depression in CKD. For instance, Palmer et al., in a meta-analysis of 216 studies evaluating CKD-related depression, reported that the median sample size was 77 patients, ranging from 10 to 7475. Among the 216 studies, 155 had a sample size of less than 99 patients [15]. The authors hope that this study can contribute as a preliminary report on depression in this understudied group of patients.

Conclusion

Based on the results of this study, it can be concluded that depression is a common psychological disorder among patients undergoing hemodialysis, regardless of their demographic, socioeconomic, educational level, dialysis-related parameters, or comorbidities. However, it tends to be more prevalent and severe in female patients and those who are illiterate. It is important to screen hemodialysis patients for depression and implement effective preventive and therapeutic measures, with special attention given to the more vulnerable groups. This can be achieved through the implementation of a multidisciplinary program involving psychiatric experts, social support volunteers, and family members, aimed at prevention, identification, and treatment of depression. Additionally, increasing knowledge and awareness among both patients and healthcare providers regarding mental and mood disorders would improve patient-provider communication, treatment adherence, and promote a healthy lifestyle. These measures can enhance the quality of life for patients, reduce complications, minimize costs, medication errors, and even mortality.

Limitations

It is important to note that this study is cross-sectional in nature, and therefore, a causal relationship between hemodialysis and depression cannot be established unless compared to a control group of non-hemodialysis end-stage kidney disease (ESKD) patients with depression. Furthermore, the BDI scale, which was used in this study, was originally designed for screening depression in the general population and may not fully capture the complexity of depression in CKD patients. In this study, more accurate results could have been obtained if the findings were validated through a structured interview-based approach in patients with moderate or higher BDI scores. A structured interview allows for a more comprehensive assessment of depressive symptoms by providing an opportunity for clinicians or researchers to directly interact with patients. This approach enables the exploration of additional information, such as the context and severity of symptoms, as well as the presence of comorbid conditions that may influence the interpretation of BDI scores. Additionally, the study would have been strengthened by including a larger sample size. One potential strategy for increasing the sample size is to collaborate with multiple research sites or centers. By involving multiple sites, researchers can access a larger pool of potential participants, thereby increasing the overall sample size. This approach allows for a more diverse and representative sample, enhancing the generalizability of the study findings to a broader population of hemodialysis patients. It is important to mention that this study represents data from adult Libyan patients undergoing hemodialysis, and further research should consider screening for depression in the pediatric age group. However, pediatric patients undergoing hemodialysis also face unique challenges and may experience depression at different rates compared to adults. Furthermore, studying depression in pediatric hemodialysis patients can provide insights into specific risk factors and protective factors that may be unique to this population. Factors such as developmental stage, family dynamics, and social support systems can significantly impact the prevalence and manifestation of depression in pediatric patients. Finally, implementing a longitudinal design in future research investigating the relationship between depression and hemodialysis can provide valuable insights and enhance our understanding of this complex association. By studying participants over an extended period, a longitudinal design allows for the examination of changes and patterns in variables of interest over time, offering several potential benefits in exploring the relation between depression and hemodialysis in patients. Availability of data and materials: Some of the data that support the findings of this study are provided in the charts included in the manuscript. Additional data can be obtained upon request from the corresponding author. However, due to ethical considerations regarding participant privacy and consent, as well as legal restrictions, certain sensitive patient data cannot be publicly disclosed.

Acknowledgment: We thank our families, colleagues, and professors for their support and assistance.

References

1. Thurlow JS, Joshi M, Yan G, et al. Global Epidemiology of end-stage kidney disease and disparities in kidney replacement therapy. *American Journal of Nephrology*. 2021;52(2):98-107. doi:10.1159/000514550
2. Liyanage T, Ninomiya T, Jha V, et al. Worldwide access to treatment for end-stage kidney disease: A systematic review. *The Lancet*. 2015;385(9981):1975-1982. doi:10.1016/s0140-6736(14)61601-9
3. Coresh, J., & Jafar, T. H. (2015). Disparities in worldwide treatment of kidney failure. *The Lancet*, 385(9981), 1926–1928. doi:10.1016/s0140-6736(14)61890-0
4. Santos PR. Evaluation of objective and subjective indicators of death in a period of one year in a sample of prevalent patients under regular hemodialysis. *BMC Research Notes*. 2012;5(1). doi:10.1186/1756-0500-5-24
5. Depression: definition [Internet]. Euro.who.int. 2012 [cited 17 December 2020]. Available from:”https://www.euro.who.int/en/health-topics/noncommunicable-diseases/pages/news/news/2012/10/depression-in-europe/depression-definition”.
6. Hirschfeld RM, Keller MB, Panico S, Arons BS, Barlow D, Davidoff F, et al. The National Depressive and Manic–Depressive Association consensus statement on the undertreatment of depression. *JAMA* 1997;277(4):333–40.
7. Ma, TK., and Li, PK. (2016) Depression in dialysis patients. *Nephrology*, 21: 639–646. doi: 10.1111/nep.12742.
8. Tian N, Chen N, Li PK-T. Depression in dialysis. *Current Opinion in Nephrology & Hypertension*. 2021;30(6):600-612. doi:10.1097/mnh.0000000000000741
9. Kimmel PL. Psychosocial factors in dialysis patients. *Kidney International*. 2001;59(4):1599-1613. doi:10.1046/j.1523-1755.2001.0590041599.x
10. Abdel-Khalek, A M. “Internal consistency of an Arabic Adaptation of the Beck Depression Inventory in four Arab countries.” *Psychological reports* vol. 82,1 (1998): 264-6. doi:10.2466/pr0.1998.82.1.264
11. Manandhar, N. R., Shakya, R., Pandey, B., & Wagley, P. (2018). Depression among patients undergoing maintenance hemodialysis at a tertiary care center in Kathmandu, Nepal. *Journal of Patan Academy of Health Sciences*, 5(2), 4-11.
12. Wuerth, Diane et al. “The identification and treatment of depression in patients maintained on dialysis.” *Seminars in dialysis* vol. 18,2 (2005): 142-6. doi:10.1111/j.1525-139X.2005.18213.x
13. Koo J-R, Yoon J-W, Kim S-G, et al. Association of Depression with malnutrition in chronic hemodialysis patients. *American Journal of Kidney Diseases*. 2003;41(5):1037-1042. doi:101016/s0272-6386(03)00201-4
14. Flavio T, Vega D, Claudio M, Milma M, Maria T, Rosilene E. Depression in hemodialysis patients: the role of dialysis shift. *Clinics (Sao Paulo)*. 2014; 69(3): 198–202.
15. Palmer S, Vecchio M, Craig JC, et al. Prevalence of depression in chronic kidney disease: Systematic review and meta-analysis of observational studies. *Kidney International*. 2013;84(1):179-191. doi:10.1038/ki.2013.77
16. Cukor D, Coplan J, Brown C, et al. Depression and anxiety in urban hemodialysis patients. *Clinical Journal of the American Society of Nephrology*. 2007;2(3):484-490. doi:10.2215/cjn.00040107
17. Ibrahim S, El Salamony O. Depression, quality of life and malnutrition-inflammation scores in hemodialysis patients. *American Journal of Nephrology*. 2008;28(5):784-791. doi:10.1159/000131101

18. Ahmad AM, Ghafoor F, Saeed Z, Shakoor A, Kanwal S. Depression in patients on hemodialysis and their caregivers. *Saudi Journal of Kidney Diseases and Transplantation*. 2012;23(5):946. doi:10.4103/1319-2442.100869
19. Bulut A. Depression levels of the hemodialysis patients living in Bingol city center. *Int J Caring Sci*. 2017;10(3):1248.
20. Hedayati SS, Bosworth HB, Kuchibhatla M, Kimmel PL, Szczech LA. The predictive value of self-report scales compared with physician diagnosis of depression in hemodialysis patients. *Kidney Int*. 2006; 69: 1662–8.
21. Donia AF, Zaki NF, Elassy M, Elbahaey W. Study of depression and quality of life among hemodialysis patients: An Egyptian experience. *International Urology and Nephrology*. 2015;47(11):1855-1862. doi:10.1007/s11255-015-1091-0
22. Sağduyu A, Sentürk VH, Sezer S, Emiroğlu R, Ozel S. Hemodiyalize Giren ve Böbrek Nakli Yapılan Hastalarda Ruhsal Sorunlar, Yaşam Kalitesi ve Tedaviye Uyum [Psychiatric problems, life quality and compliance in patients treated with hemodialysis and renal transplantation]. *Turk Psikiyatri Derg*. 2006;17(1):22-31.
23. Kaballo BG, Idris M, Alhaj HI, Gadour MOH. Psychological disorders and quality of life among Sudanese dialysis patients and renal transplant recipients. *Sudan Journal of Medical Sciences*. 2010;5(1). doi:10.4314/sjms.v5i1.56028
24. Hamody AR, Kareem AK, Al-Yasri AR, Sh Ali AA. Depression in Iraqi hemodialysis patients. *Arab J Nephrol Transplant*. 2013;6(3):169-172.
25. Alashek WA, McIntyre CW, Taal MW. Epidemiology and Aetiology of dialysis-treated end-stage kidney disease in Libya. *BMC Nephrology*. 2012;13(1). doi:10.1186/1471-2369-13-33
26. Kring AM, Gordon AH. Sex differences in emotion: expression, experience, and physiology. *J Pers Soc Psychol*. 1998 Mar;74(3):686-703. doi: 10.1037//0022-3514.74.3.686. PMID: 9523412.
27. Anees M, Barki H, Masood M, Mumtaz A, Kausar T. Depression in hemodialysis patients. *Pak J Med Sci* 2008;24(4):560-5.
28. Oner N. Psychological tests used in Turkey: A reference source. Istanbul: Bogazici University Press; 1997.
29. Bowirrat A, Armaly, Farah, et al. Major depressive disorders in chronic hemodialysis patients in Nazareth: Identification and assessment. *Neuropsychiatric Disease and Treatment*. 2012;329. doi:10.2147/ndt.s31903
30. Aldukhayel A. Prevalence of depressive symptoms among hemodialysis and peritoneal dialysis patients. *International Journal of Health Sciences*. 2015;9(1):9-15. doi:10.12816/0024678