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DETERMINATION OF IN-HOSPITAL CONSEQUENCE OF AKI WITH ETIOLOGY AMONG NEW BIRTHS

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Abstract:
Objective: This research work aimed to find out the correlation in-hospital consequence of acute kidney injury (AKI) with etiology in new births at our institute.
Methodology: This was a descriptive transverse research work conducted at Pediatric Department of Sir Ganga Ram hospital, Lahore with the use of the non-probability technique of sampling From July 2018 to July 2019. Total one hundred and one new births diagnosed with AKI were the part of this research work. We assessed the etiological factors and we followed these patients till their discharge to screen the in-hospital results.
Result: Out of total one hundred and one newborns, 74.30% (n: 75) were male babies whereas 25.70% (n: 26) were baby girls. The average age of these patients was 7.590 ± 6.130 days with a range of age from one to twenty eight days. The average age of the males was 5.730 ± 7.20 days whereas the average age of the girls was 6.770 ± 6.160 days. The average weight of the new births was 2545.050 ± 600.420 grams with a range of weight from 1000 to 4000 grams. The average level of serum potassium was 4.940 ± 0.920 mgEq/L with a range from 3.10 mgEq/L to 7 mgEq/L. The average level of urea 73.350 ± 27.650 mg/dl with a range from 18.0 mg/dl to 206.0 mg/dl. The average level of serum creatinine was 1.980 ± 0.270 mg/dl with a range from 1.60 mg/dl to 2.80 mg/dl. The average level of serum sodium was 145.720 ± 12.640 mgEq/L with a range from 126.0 to 166.0 mEq/L. Total 80.20% (n: 81) babies were term babies whereas 19.80% (n: 20) babied were pre-term. Among total studied population, 28.70% (n: 29) delivered through vagina whereas 71.30% (n: 72) delivered through CS (Cesarean Section). We noted the delayed crying in 47.50% (n: 48), dehydration in 12.90% (n: 13), sepsis in 35.60% (n: 36) & renal malformation in 4.0% patients. The rate of mortality in these patients was 14.90% (n: 15) whereas 85.10% (n: 86) infants got discharge from department after complete recovery.
Conclusion: Asphyxia & sepsis are the most important etiological factors responsible for the AKI in new births which have strong association with the high rate of morbidity as well as mortality. This complication is more frequent in males as compared to females. The rate of mortality was much high in our patients and it has strong association with the female gender. There was a strong association of the mortality with the increased level of serum urea & sodium.
Keywords: *AKI, association, mortality, sodium, recovery, morbidity, urea, methodology.*

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INTRODUCTION:

AKI is the reduction in the function of kidneys that causes decline in GFR (Glomerular Filtration Rate) [1-3]. AKI is one of the important reasons for the high rate of morbidity as well as mortality among neonates. AKI is the consistent enhancement in plasma creatinine levels by greater than 1.50 mg/dl for greater than twenty four hours among neonates with full term in the duration of initial few days of their lives [4, 5]. In the pre-term newborns, the levels of serum creatinine in initial days of lives may not provide a real picture of the GFR because the level is much high in first few days of life but it decreases gradually with the passage of time [6]. According to various research works. The range of AKI is from 8.0% to 24.0% whereas these patients can have their classification in 2 groups as oliguric & non-oliguric. However, this type of decrease in the output of urine can also available in the non-availability of the AKI, hence cannot be recommended as the sole standard for the whole process of diagnosis [7, 8].

Asphyxia & sepsis are the most common cause of the AKI in neonates whereas some other conditions in new births with the development of acute kidney injury are dehydration, RDS (Respiratory Distress Syndrome), bleeding and nephrotoxic drug [9, 10].

The estimation of levels of serum creatinine remains the simple, fast and widely used means for evaluation of the function of kidneys drops significantly from 1.10 mg/dl to 0.40 mg/dl during first 2 weeks of life after the term delivery whereas from 1.30 mg/dl in pre-term births [11-14, 15]. Some research works stated the genetic risk factors for the failure of renal function among newborns [16]. This research work carried out to find out the correlation of the AKI outcome with various etiological factors of AKI in newborns.

METHODOLOGY:

This research work carried out in Pediatric Department of Sir Ganga Ram Hospital, Lahore. A sum of total one hundred and one neonates with AKI who were admitted in our institute in the duration of this research work were the participants of this research work. We used a calculator for the selection of sample size with the help of Epi-info software of CDC by anticipation of 20.0% [17]. Newborns with lower than twenty eight year of age suffering from AKI were the part of this research work. We defined the acute kidney injury as levels of serum creatinine greater than 1.50 mg/dl regardless of the age of the patients. A consultant pediatrician evaluated the newborns clinically for various reasons of acute kidney injury like asphyxia, dehydration, renal malformation and sepsis.

Table-I: Cross - tabulation of in-hospital outcome with study variables. (n=101)

| Variables		Discharged	Mortality Cases	p-value
Gender	Boys (n=75)	67.0	8.0	0.0500
	Girls (n=26)	19.0	7.0	
Gestation	Term (n=81)	70.0	11.0	0.4890
	Preterm (n=20)	16.0	4.0	
Mode of delivery	Vaginal (n=29)	26.0	3.0	0.5450
	C - section (n=72)	60.0	12.0	
Delayed Crying	Yes (n=48)	41.0	7.0	1.0000
	No (n=53)	45.0	8.0	
Sepsis	Yes (n=36)	32.0	4.0	0.5640
	No (n=65)	54.0	11.0	
Dehydration	Yes (n=13)	10.0	3.0	0.4040
	No (n=88)	76.0	12.0	
Renal malformation	Yes (n=04)	3.0	1.0	0.4800
	No (n=97)	83.0	14.0	
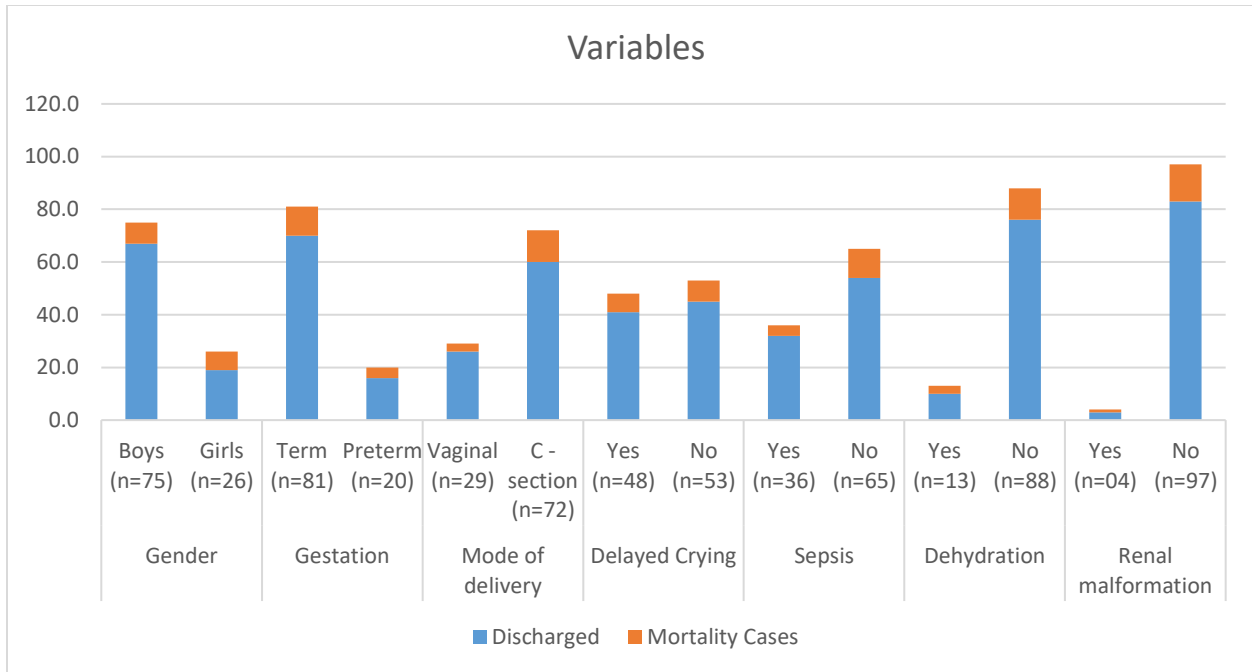
We used the standard definitions of all these anomalies present in the international literature. We measured the AKI Outcome in neonates in terms of mortality rates during their stay at hospital. We noted the other related data like sex, age, gestational age and delivery mode on a well-organized Performa. Ethical committee of the hospital gave the permission to conduct this research work. The parents of all the patients gave the permission to conduct this research work. SPSS V.20 was in use for the statistical analysis of the collected information.

Table-II: Serum Biochemical parameters with regards to in-hospital outcome. (n=101)

| Serum Potassium Level (mEq/L)		Serum Urea (mg/dl)		Serum Sodium level (mEq/L)	
Mean	SD	Mean	SD	Mean	SD
4.910	0.860	69.350	23.670	144.620	12.900
5.120	1.220	96.270	37.450	152.000	9.050
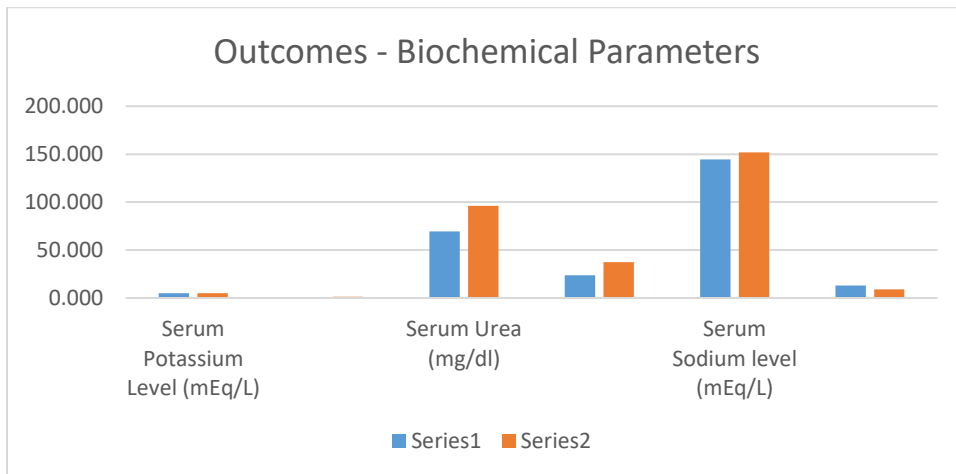
RESULTS:

We selected total one hundred and one 101 newborns with AKI. Among these, 74.30% (n: 75) babies were boys whereas 25.70% (n: 26) babies were girls. The average age of the newborns was 7.590 ± 6.130 days with a range from 1 to 28 days. The average of the males was 5.730 ± 7.20 days whereas the average of females was 6.770 ± 6.160 days. The average weight of the new births was 2545.050 ± 600.420 grams with a range of weight from 1000 to 4000 grams. The average level of serum potassium was 4.940 ± 0.920 mgEq/L with a range from 3.10 mgEq/L to 7 mgEq/L. The average level of urea 73.350 ± 27.650 mg/dl with a range from 18.0 mg/dl to 206.0 mg/dl. The average level of serum creatinine was 1.980 ± 0.270 mg/dl with a range from 1.60 mg/dl to 2.80 mg/dl.

Table-III: Serum Biochemical parameters with regards to delayed crying. (n=101)

Bio Chemical Parameters --->		Serum Potassium Level (mEq/L)		Serum Urea (mg/dl)		Serum Sodium level (mEq/L)	
		Mean	SD	Mean	SD	Mean	SD
Delayed Crying	Yes	5.180	0.830	79.690	42.460	146.790	9.410
	No	4.730	0.940	67.660	21.170	144.750	15.020
P-value		0.0140		0.0280		0.4220	
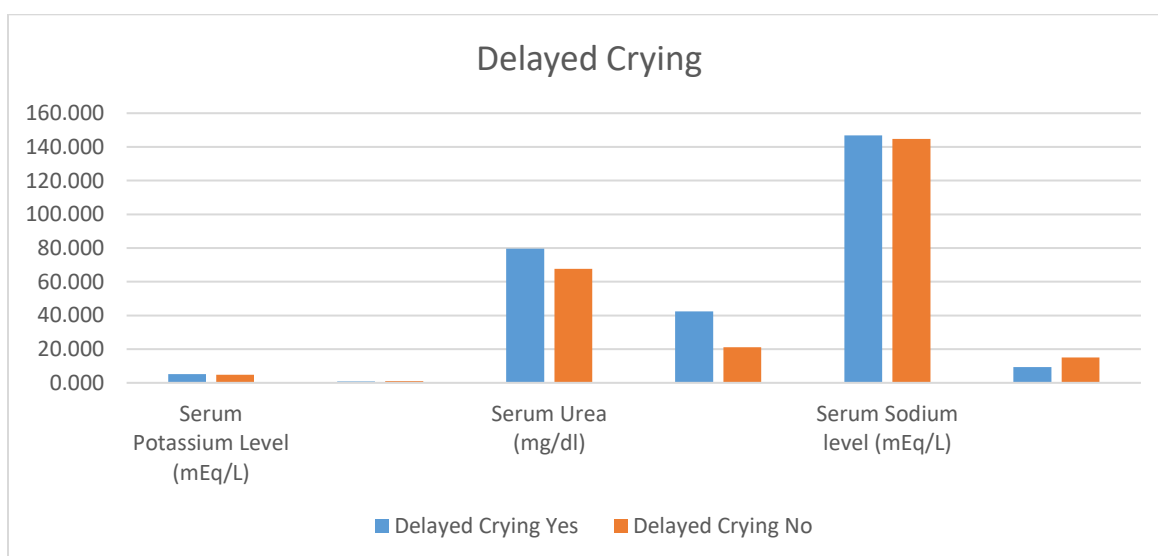
The average level of serum sodium was 145.720 ± 12.640 mgEq/L with a range from 126.0 to 166.0 mEq/L. Total 80.20% (n: 81) babies were term babies whereas 19.80% (n: 20) babied were pre-term. Among total studied population, 28.70% (n: 29) delivered through vagina whereas 71.30% (n: 72) delivered through CS (Cesarean Section). We noted the delayed crying in 47.50% (n: 48), dehydration in 12.90% (n: 13), sepsis in 35.60% (n: 36) & renal malformation in 4.0% patients. The rate of mortality in these patients was 14.90% (n: 15) whereas 85.10% (n: 86) infants got discharge from department after complete recovery.

Table-IV: Serum Biochemical parameters with regards to sepsis. (n=101)

Biochemical parameters		Sepsis		P - value
		Yes	No	
Serum Potassium Level (mEq/L)	Mean	4.520	5.180	0.0010
	SD	0.960	0.800	
Serum Urea (mg/dl)	Mean	66.030	77.400	0.0470
	SD	18.350	31.060	
Serum Sodium level (mEq/L)	Mean	145.130	146.040	0.7320
	SD	9.150	14.270	

Sepsis - Biochemical Parameters
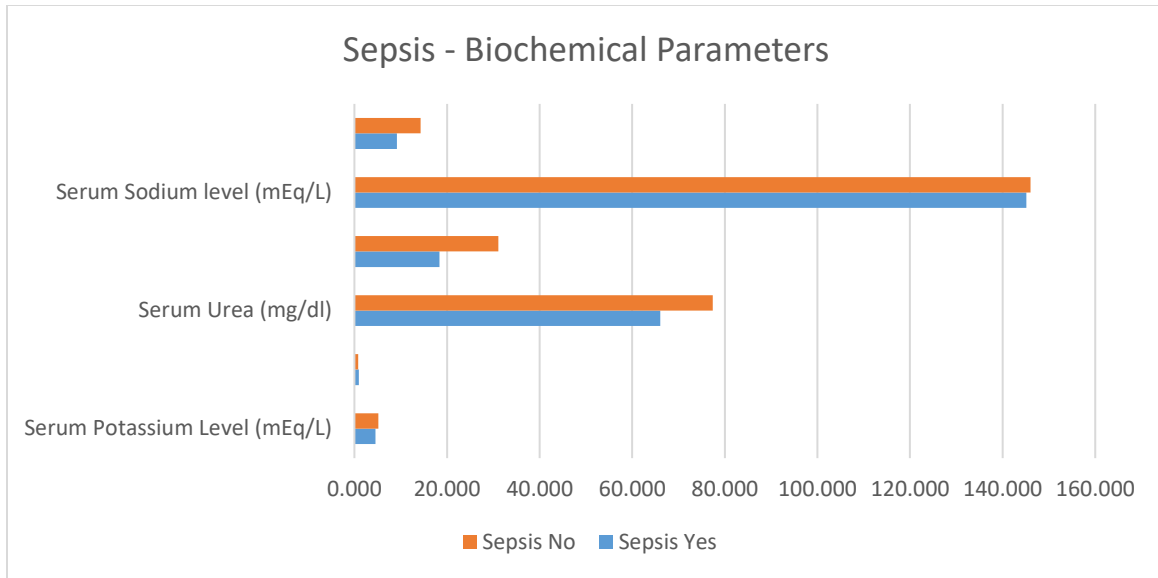
Table-V: Serum Biochemical parameters with regards to dehydration. (n=101)

Biochemical parameters		Dehydration		p-Value
		Yes	No	
Serum Potassium Level (mEq/L)	Mean	5.300	4.890	0.7020
	SD	0.680	0.930	
Serum Urea (mg/dl)	Mean	76.000	72.950	0.0700
	SD	26.060	28.010	
Serum Sodium level (mEq/L)	Mean	150.840	144.960	0.0170
	SD	6.610	13.160	

Dehydration - Biochemical Parameters
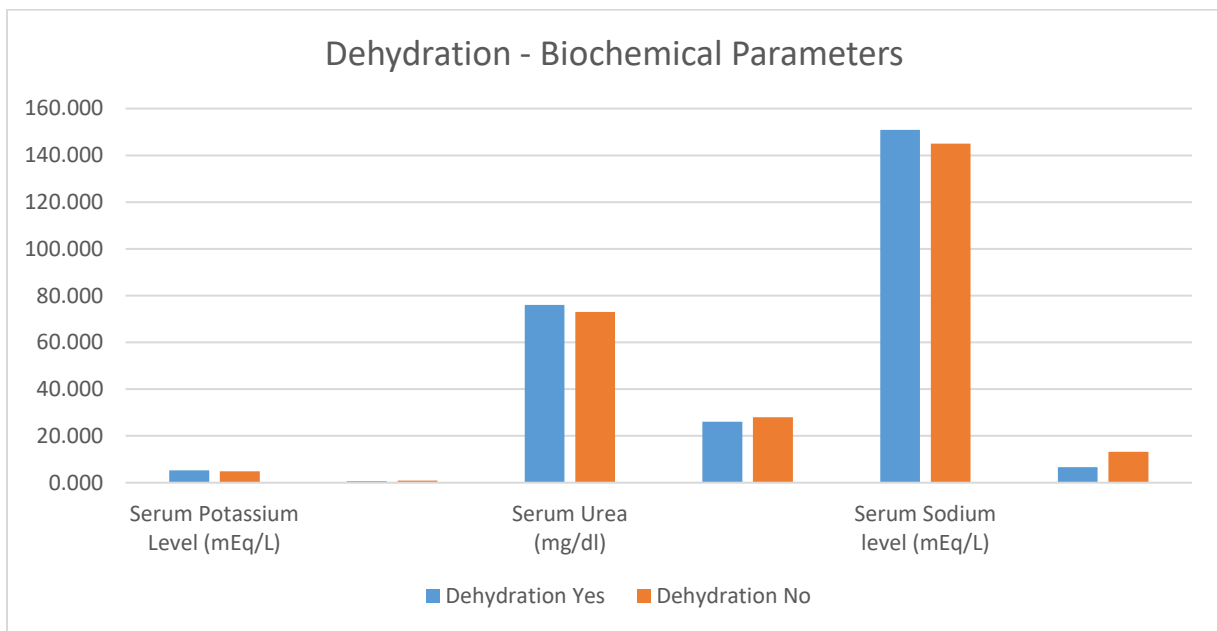
DISCUSSION:

Various research works conducted in different areas of the world have stated the high incidence of the prompting factors of acute failure of kidneys in boys in comparison with the girls. In the same manner, there were 74.30% (n: 75) boys and 25.70% (n: 26) girls in our research work. Gharehbaghi [17] in his research work conducted in Iran stated female to male ratio as 1:2.03 (33.0% versus 67.0%) displaying the same results as that of this current research study. Same findings were the outcome of the research works stated by Airede [18], Kandoth [19] and Bourquia [20]. But Momtaz [21] displayed the female gender as the dominating gender in his research work.

Few months just after the start of life are very important to observe the acute renal failure. Similarly in this current research work, the average age of the neonates suffering from AKI 7.590 ± 6.130 days with a range of age from one to twenty days. Gharehbaghi [17] also reported the average age of 5.260 ± 6.20 days with a range from two to twenty eight days in his research work in his research work conducted in Iran. Momtaz [21] stated the 7.70 ± 6.30 days as average age in neonates suffering from acute kidney injury. In this current research work, 80.20% patients were the term babies whereas 19.80% neonates were pre-term babies. In the same manner, Gharehbaghi [17] stated the 25.90% neonates as pre-term deliveries. There was a strong association of the asphyxia at the time of birth & sepsis with the acute kidney injury in whole world [21-23] which has been reached to 78.0% in various research works.

CONCLUSION:

Asphyxia and sepsis are the main responsible etiological factors having association with the high rate of morbidity and mortality among neonates present with AKI. These complications are more frequent in males as compared to the females. There was high rate of mortality in our research work and it was present with significant association female gender. The mortality rate was present with association with the raised urea and sodium level.

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