Section: Paediatrics

Original Research Article

STUDY OF CLINICAL PROFILE AND PREVALENCE OF UTI AMONG SSNS CHILDREN WITH RELAPSE ANDTO DETERMINE THE CAUSATIVE MICROORGANISMS OF UTI AND THEIR SENSITIVITY PATTERN TO ANTIBIOTICS AMONG SSNS CHILDREN WITH UTI

N. Madhavi[1], M. S Raju[2], P. Sunil Kumar[3], M . Giridora[4], V. Bangaru[5], ShaikKhushbu[6]

[1]1Professor, Department of Paediatrics, Rangaraya Medical College, India.
[2]Professor and Head, Department of Paediatrics, Andhra Medical Collage, India.
[3]Assistant Professor, Department of Paediatrics, Andhra Medical College, India.
[4]Assitant Professor, Department of Paediatrics, Andhra Medical College, India.
[5]Junior Resident, Department of Paediatrics, Andhra Medical C0llege, India.
[6]Senior Resident, Department of Paediatrics, Andhra Medical College, India.

Received *: 10/10/2023*
Received in revised form *: 06/12/2023*
Accepted *: 22/12/2023*

Corresponding Author:
Dr. M .Giridora
Assistant professor, Department of Paediatrics, Andhra Medical College, Andhra Pradesh, India.
Email: drdora009@gmail.com

DOI: 10.5530/ijmedph.2023.4.40

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2023; 13 (4); 204-211

ABSTRACT

Background: Nephrotic Syndrome, a common renal disorder in children Is characterizedby massive proteinuria with edema, hypoalbuminemia, and hyperlipidemia. Minimal change nephrotic syndrome (MCNS) accounts for about 80% of idiopathic nephrotic syndrome with good prognosis. Inspite of relapses majority achieve remission by 2nd decade. More than 95% of MCNS respond well to steroid therapy (SSNS). Infections especially UTI frequently predispose to relapses in NS. UTI in children may be unrecognized as it may be asymptomatic mostly in children with nonspecific symptoms. Early identification and prompt treatment of UTI is important for proper management of children with NS. **Aims and Objectives:** To Study the clinical profile and prevalence of UTI among SSNS children with relapses and to determine the causative microorganisms among SSNS children with UTI and their sensitivity pattern to antibiotics.

Materials and Methods: Hospital based observational study in a Tertiary Care Hospital(TCH) over a periodof1year. 70 children of steroid sensitive nephrotic syndrome with relapses of>2years of age were included in the study after taking prior permission from Institute Ethics Committee and a written informed consent from parents/guardian of the patients enrolled in this study. Children with Urinary tract infection. and previously treated with or on antibiotics within 15 days prior to admission and those with anatomical abnormalities of genitourinary tract were excluded from the study. Detailed history was taken regarding demographic details like age of onset, gender, number of relapses, clinical features at the time of admission, chronic illness like Tuberculosis and fungal infections and treatment given and detailed examination was done. Laboratory investigations like Complete blood picture, serum protein, serum cholesterol, Renal function tests, urine examination, urine culture and sensitivity, chest x-ray, Mantoux test and ultrasound abdomen were done as per requirement. Data obtained was tabulated and scientifically analyzed using SPSS 21Version.

Results: Out of 70 children with SSNS with relapses, maximum incidence was in the age group of 2-6 years with male: female ratio of 1.5: 1. Common clinical presentations at the time of admission were facial puffiness (100%), abdominal distension (42.9%), pedal edema (37.1%), decreased urine output

(28.6%) and burning micturition (27.1%). Common clinical findings were pallor (41.4%), pedal edema (35.7%) and ascites (31.4%). Infections were seen among 48.6% of children and UTI (25.7%) was most common infection, 60% were infrequent relapses (IFR), 40% were frequent relapses (FR) . UTI was more common in frequent relapsers (67.8%). Unimmunized children were at higher risk of developing infections (65%). However, there was no statistically significant association between infection and immunization status. Majority of culture positive (62.5%) SSNS were symptomatic. There was significant association between symptoms & culture sensitivity (p value 0.01). Significant pyuria seen in 83.3% of culture positive SSNS which was statistically significant (p value 0.018). Most common organism isolated was E. Coli (37.5%). All organisms isolated in this study were found to be sensitive to Amikacin and all were resistant to ampicillin+ sulbactam, amoxicillin, cotrimoxazole.

Conclusion: Infections especially UTI is one of the most common causes of relapse in SSNS especially in frequent relapsers. Children with infections show unsatisfactory response to steroids. It is difficult to diagnose UTI with non-specific symptoms in young children with NS. High index of suspicion is required for accurate diagnosis of infections especially UTI in NS as UTI may be asymptomatic. Earlyinstitution of appropriate antibiotics enables children to go into early remission with good outcome.

Keywords: Steroid sensitive NS, FR, IFR, UTI

INTRODUCTION

Nephrotic syndrome is a common renal disorder in paediatric population. 90% of the children with NS present with primary or idiopathic NS. MCNS accounts for about 80% of idiopathic NS and more than 95 % of MCNS cases respond to corticosteroid therapy.

Despite the very high initial response to steroids and the favourable prognosis in children with SSNS, relapses occur in 60 to 90 % of these responders. Some show infrequent relapses while others have frequent relapses. Relapse is often triggered by URTI or infection at other sites.

UTI is the second most common infection after URTI contributing to relapses in NS. Symptoms of UTI are different in various age groups. In general, younger the child, the symptoms and signs of UTI are less localizing. UTI, if left untreated will complicate the course of both UTI and NS. Assessment of the magnitude of Problem of UTI in NS and the bacterial spectrum of UTI will help in selecting the empirical antibiotic therapy till culture reports are available. Present study was undertaken to find out the prevalence of UTI and the clinical and laboratory features in children admitted with SSNS with frequent and infrequent relapses and also to determine the causative microorganisms and their sensitivity to antibiotics.

Aims and Objectives

To Study the clinical profile and prevalence of SSNS children with relapse, and prevalence of UTI among SSNS children with relapses correlation between UTI and serum cholesterol levels among children with SSNS and to determine the causative microorganisms among children with UTI and their sensitivity pattern to antibiotics.

MATERIAL AND METHODS

It was a prospective hospital based observational study in a TCH over a period of 1 year. 70 children of steroid sensitive nephrotic syndrome with relapses of >2years of age were included in the study after taking prior permission from Institute Ethics Committee and a written informed consent from parents/guardian of the patients. Children with Urinary tract infection and previously treated with or on antibiotics within 15 days prior to admission and Presence of anatomical abnormalities of genitourinary tract were excluded from the study. Detailed history was taken regarding demographic details like age of onset, gender, number of relapses, clinical features at the time of admission, treatment given and detailed examination was done. The presence of any chronic illness like tuberculosis, fungal infections was recorded. Laboratory investigations like Complete blood picture, serum protein levels, serum cholesterol, Renal function tests, urine examination, urine culture and sensitivity, chest x-ray, Mantoux, ultrasound abdomen were done as per requirement. Data obtained was tabulated and scientifically analyzed using SPSS 21Version.

Diagnosis of SSNS was done according to ISKD criteria. Relapse was defined as proteinuria>40mg/hour/m2 or urine albumin >3+ for 3 consecutive days after been in remission6. UTI was considered with symptoms suggestive of UTI/ urine microscopy > 5 pus cells per hpf of centrifuged urine/ culture positivity38. Data

obtained was tabulated and scientifically analyzed using SPSS 21Version.

RESULTS

A total of 70 children with steroid sensitive nephrotic syndrome were enrolled in this study. 78.6% children were below 6 years of age and 21.4% were between 7-12 years. The mean age of these children was 5.8 yr. Male: female ratio was 1.5:1. 41 (58.6%) belonged to rural area and 29 (41.4%) to urban area. Majority of children were from lower middle (58.6%) class.

Clinical Profile: The most common sign in the study population was pallor (n=29,41.4%), followed by pedal edema (n=25,35.7%). Among 70 patients, 40% were frequetly relapsing cases, and 60% were infrequent relapse cases.

Among 70 children with relapses, 34 (48.6%) had infections. 51.4% had no infection. Most common infection was UTI (25.7%), 2nd most common was URTI. Children in the age group of 3-6 years had infections in 53%, whereas risk of infections was 20.5% in 6months- 2years, 14.7% in 6-9 years and 11.8% in 9-12 years. There was no statistical significance between age and infections.

Table 4 shows correlation between clinical profile and type of relapse. Among children < 5 years of age 46.1% had frequent relapses and 53.9% had infrequent relapses whereas in children > 5 years 36.4% had frequent relapses and 63.6% had infrequent relapses. There was no significant association between age or risk of infection or response to steroids and frequency of relapse in nephrotic syndrome.

In frequent relapsers, 67.8% had infections. Out of that most common was UTI.35.7%. 25% had URTI, 7.1% had pneumonia and 32.2% had no infection. In IFR 19% had UTI, 14.3% had URTI, and 2.5% had pneumonia. 64.2% had no infection in IFR. Steroid response within 2 weeks was observed in 32%(n=9) cases of frequent relapses and 59.5%(n=25) of cases in infrequent relapses. 68%(n=19) showed response to steroids after 2 weeks in FR and 40.5%(n=17) in IFR.

Out of 70 children, 45 were completely immunized with national immunization schedule, partially immunized in 8 cases and 17 were unimmunized. None of the children received special vaccines like pneumococcal, varicella and influenza vaccines in this study. 65%(n=11) of 17 unimmunized children were prone to infections. 50%(n=4) of partially immunized children had infections and 42%(n=19) of completely immunized children had infections. There was no statistical significance between infections and immunization status in the study population

Steroid toxicity was seen in 6 (21.4%) of FR and 3 (7.1%) of IFR. Steroid toxicity was not significantly associated with the frequency of relapse in nephrotic syndrome. [Table 4]

Table 5 shows frequency of UTI in different categories of study population.

UTI was seen in 18 cases of SSNS. Out of 18 cases of UTI 9(50%) cases were male, remaining 9(50%) were females. Out of 42 male children 9 (21.4%) had UTI and out of 28 female children 9(32.1%) had UTI. There was no statistical significance between gender and UTI in this study. Out of 18 UTI cases 13(72.3%) children were <6years of age. Rest of 5(27.7%) were >6years. 55 children were in the age group of 2-6 years of that 23.6% had UTI. 15 children belonged to 7-12 years of age where 33.3% had UTI. It was not statistically significant association between age & UTI. [Table 6]

Out of 18 cases of UTI 10 cases were seen in FR and 8 in IFR. There was no statistical significance between frequency of relapse and risk of UTI in this study. Out of 18 UTI cases 15 children found to have serum cholesterol levels > 400 and remaining 3 had <400mg/dl. Out of 52 non UTI cases 48 children found to have serum cholesterol levels < 400 and 4 had > 400mg/dl. There was significant correlation between UTI and levels of cholesterol. Mean serum albumin in UTI was 1.75 and in non UTI was 1.73. There was no significant association between UTI and mean serum albumin level

UTI was considered based on symptoms/pyuria/culture positivity. Total of 18 cases were diagnosed as UTI of that only culture positive was 8 (44%), 33% were only symptomatic (n=6). Out of 8 culture positive cases 5(62.5%) were symptomatic, 3(37.5%) were asymptomatic. Out of 18 cases of UTI, significant pyuria (>5 white cells/high power field in a centrifuged urine sample) present in 6 cases. In those 6 cases, 5(83.3%) were culture positive and remaining 1(16.7%) case was culture negative. Insignificant pyuria seen in 12 cases of that 3(25%) were culture positive and 9(75%) were culture negative. There was a statistical significance between pyuria and culture sensitivity. [Table 5]

In the present study the organism isolated was E. coli in 3(37.5%) cases, followed by Klebsiella in 2(25%) cases, pseudomonas in 2(25%) cases, CONS in 1(12.5%) case.

The most common organism isolated was E. Coli which was resistant to penicillin, cephalosporin, fluroquinolone group of antibiotics, vancomycin, cotrimoxazole, nalidixic acid and. It was found to be most sensitive to meropenem (100%) and nitrofurantoin (100%) followed by amikacin (67%) and Fosfomycin (67%).; All organisms isolated were found to be sensitive to amikacin.

Table 1: Demographic Details of Children with SSNS (Steroid Sensitive Nephrotic Syndrome)

	Frequency	Percentage
AGE[YEARS]		
2 – 6	55	78.6

7-12	15	21.4
GENDER		
Male	42	60
Female	28	40
RESIDENCE		
Rural	41	58.6
Urban	29	41.4
Socioeconomic status		
Upper lower	16	22.8
Lower middle	41	58.6
Upper middle	13	18.6

The most common presentation at the time of admission was facial puffiness 100% (n=70), followed by abdominal distension 42.9% (n=30).

Table 2: Clinical profile of study population

Symptoms	No. (n = 70)	Percentage (%)
Facial puffiness	70	100
Abdominal distension	30	42.9
Pedal edema	26	37.1
Scrotal edema	22	31.4
Decreased urine output	20	28.6
Burning micturition.	19	27.1
Abdominal pain	15	21.4
Fever	14	20
Vomiting	8	11.5
Cold & cough	15	21.4
Respiratory distress	3	4.3

Table 3: Shows profile of clinical signs in the study population

Sign	No. (n=70)	Percentage (%)
Hypertension	11	15.7%
Pedal edema	25	35.7%
Ascites	22	31.4%
Organomegaly	07	10%
Pleural effusion	17	24.3%
Pallor	29	41.4%
Type of relapse -Frequent relapse - Infrequent relapse	 28 42	 40% 60%
Infection -UTI -RTI -No infection	34 18 13 36	48.6% 25.7% 18.6% 51.4%

Table 4: Clinical Profile of SSNS with Type of Relapse

Age (years)	Frequent relapse (n=28)	Infrequent relapse (n=42)	P – value
< 5	12 (46.1%)	14(53.9%)	0.419
≥5	16(36.4%)	28 (63.6%)	
Infection UTI URI Pneumonia No infection	19[67.8%] 10[35.7%] 7[25%] 2[7.1%] 9[32.2%]	15[35.8%] 8 [19, %] 6[14.3%] 1[2.5%]	0.068
Response to Steroids <2 weeks >2 weeks	Frequent relapse[n=28] 9[32%] 19[68%]	Infrequent relapse[n=42] 25[59.5%] 17[40.5%]	p-value 0.024
Immunization status Completely immunized Partially immunized Un immunized	 19[42.2%] 5[62.5%] 4[23.5%]	 26[57.8%] 3[37.5%] 13[76.5%]	0.157
Steroid toxicity Present Absent	6[21.4%] 22[78.6%]	3[7.1%] 39[92.9%]	0.08

Table 5: Distribution of study population with UTI according to age, gender, type of relapse, cholesterol level

	Frequency (n = 70)	No. of UTI (n=18)	P value
Age 2-6 years	55(78.5%)	13(23.6%)	0.56

7-12 years	15(21.5%)	5(33.3%)	
Gender Male Female	 42[60%] 28[40%]	 9[21.4%] 9[21.4%]	0.31
Type of relapse Frequent Infrequent	 28[40%] 42[60%]	 10[35.7%] 8[19%]	
Type of UTI Symptomatic With pyuria Culture positive	 6 6 8		
Cholesterol level >400 <400	UTI 15 3	NON UTI 4 48	0.0001

Table 6: Distribution of study population according to culture sensitivity

Variable	Total (n=18)	Percentage
Urine culture negative	10	56%
Urine culture positive	8	44%

Table 7: Correlation between gender and urine culture sensitivity

Gender	Culture positive	Culture negative	Total	P-value
Male	3(33.3%)	6(66.7%)	9	0.342
Female	5(55.5%)	4(44.5%)	9	

Table 8: correlation of symptoms of UTI with urine culture sensitivity

Urine c/s	Symptomatic	Asymptomatic	Total	P -value
Culture negative	1(10%)	9(90%)	10	
Culture positive	5(62.5%)	3(37.5%)	8	0.01

Table 9: Distribution of causative agents of UTI isolated in this study

Organisms (n=8)	Frequency
E.Coli	3(37.5%)
Klebsiella	2(25%)
Pseudomonas	2(25%)
CONS	1(12.5%)

Table 10: Sensitivity pattern of various organisms in UTI of nephrotic syndrome

Urine culture organism/antibiotic	E. coli	Klebsiella	Pseudomonas	CONS
Ampicillin+ sulbactam	R	R	R	R
Amoxicillin	R	R	R	R
Amikacin	67%	50%	50%	100%
Cefepime	R	R	50%	R
Cefpodoxime	R	50%	R	R
Ceftazidime + clavulanate	R	R	100%	R
Ciprofloxacin	R	R	50%	R
Cotrimoxazole	R	R	R	R
Fosfomycin	67%	50%	R	R
Levofloxacin	R	R	R	100%
Meropenem	100%	R	50%	R
Norfloxacin	R	100%	R	R
Nitrofurantoin	100%	50%	R	R
Nalidixic acid	R	50%	R	R
Piperacillin + tazobactam	R	R	50%	100%
Vancomycin	R	R	R	100%

DISCUSSION

Nephrotic syndrome is characterized by the presence of massive proteinuria, edema, hypoalbuminemia, and hyperlipidemia. Minimal change nephrotic syndrome (MCNS) accounts for about 80% of idiopathic nephrotic syndrome, and more than 95% of minimal change nephrotic syndrome cases respond well to steroid therapy. Nephrotic syndrome is an immunocompromised state with high risk of infections due to decreased serum immunoglobulins and bactericidal activity of leucocytes, protein deficiency, loss of complement factors. UTI is one of the most common infections for the relapses in nephrotic syndrome but it is often unrecognized due to non-specific symptoms in young age group.

In the present study, a total of 70 children of age group 2-12 years with SSNS with relapses were studied over a period of 1 year. The age distribution of study population showed 55(78.6%) children were below 6 years of age and 15 (21.4%) children were between 7-12 years of age. The mean age group of the enrolled children was 5.8 years.

Sabyasachi Bakshi et al, LC Kundu et al,[12] Subinay Mandal et al,[16] and MN Sarker et al,[23] reported in their study that majority of children belonged to 2-7 years (76.83%)1 to 2 yrs, 2 to 7 years and 2 to 6 years (67%) of age group respectively. However, Shatha Hussain et al,[25] reported most common age group of patients with nephrotic syndrome was from 9-12 years which was similar to the study by Patricia Y. Gunawan et al,[13] and RajendraNamedoPatil et al,[21] (34.38%). Nephrotic syndrome is commonly seen in younger age group. It is mostly due to MCNS and these children (90%) respond very well to steroids with very good outcome. Nephrotic syndrome in older age group is mostly due to significant lesion NS with variable outcome. Immunosuppressive treatment with corticosteroids is given in all children presenting at younger age at the time of 1st episode without doing a renal biopsy as majority of these children will be having MCNS. In the present study most common age group was 2-6 years of age. Most of studies also had reported common age group as 2-6 years of age.

Slight male predominance of 1.5: 1 is seen in the most common type of NS with MCNS. In the present study male children constituted 42(60%) cases and female children constituted 28 (40%) cases, with male: female ratio of 1.5: 1. Predominance of male children with NS was also reported in various other studies.

In the present study, most common symptom was facial puffiness in 70 (100%) cases, followed by abdominal distension in 30(42.9%) cases, pedal edema 26(37.1%), scrotal edema 22 (31.4%), decreased urine output in 20 (28.6%), burning micturition in 19 (27.1%), abdominal pain & cold, cough in 15 (21.4%) each, fever in 14 (20%), vomiting in 8 (11.5%) and respiratory distress in 3 (4.3%) cases.

LC Kundu et al,[12] study reported most common symptom as fever 29(46.8%), followed by seizures due to fever 14(22.6%), diarrhea in 12(19.4%), bad smell of urine 11(17.7%), vomiting associated with diarrhea and respiratory symptoms 10(16.1%) each.

Abdalla et al study presented with generalized body swelling 105(100%) followed by fever 32(30.5%) Shatha Hussain Ali et al study25 reported abdominal pain as the most common symptom followed by frequency, fever, dysuria and urgency.

In this study the most common sign was pallor 29(41.4%), followed by pedal edema 25(35.7%), ascites 22(31.4%), pleural effusion 17(24.3%), hypertension 11(15.7%) and organomegaly 7(10%). In contrast to present study, Rajendra Namedo Patil et al,[21] study showed hypertension 17(53.13%) as the most common sign followed by pitting edema 15(46.88%), ascites 13(40.63%), hepatomegaly and pallor 11(34.38%) and 9(28.13%) respectively.

60%0 children with NS had infrequent relapses, and remaining had frequent relapses. Infections like URTI, UTI are the common triggers for the relapse. Similar scenario was seen in Ekremah K. Shaker et al,[17] study which showed infrequent relapses in 59% (n=40) and frequent relapses in 41% (n=28). Nephrotic syndrome is an immunocompromised state due to loss of immunoglobulins, complement factors, factor B which help in phagocytosis of organisms. Infections is the major complication in all children with nephrotic syndrome. Other complications include hypovolemia, thromboembolism, acute renal failure. In this study 48.6% (n=34) had infections and of that 25.7% (n=18) had UTI, 18.6% (n=13) had URTI and 4.3% (n=3) had pneumonia. 51.4% (n=36) had no infection.

As infections are most common cause for relapses, all these children should be completely immunized with national immunization schedule. Most common infections in children with NS are due to Streptococcal pneumoniae, gram negative organisms and varicella is also an important infection in these children. Maximum incidence of infections in the present study was in the age group of 2-6 years.

UTI was more common in frequent relapsers (67.8%). Majority of culture positive (62.5%) SSNS were symptomatic. There was significant association between symptoms, pyuria & culture sensitivity.

All children with NS should be administrated with pneumococcal, varicella & influenza vaccines in addition to the vaccines of national immunization schedule. Care should be taken to give live vaccines like varicella. It should be given 1 month after stoppage of steroids when the child is in remission. Care should be taken to give live vaccines not only to the children with NS but also to their contacts.

In the present study, 65% of unimmunized and 50% of partially immunized children had infections and 42% of completely immunized children had infections. There was no statistically significant association between infection and immunization status bor type of relapse (FR vs IR) MuktaMantan et al20 study showed URTI (45%) as the most common infection followed by peritonitis (18.8%), diarrhea (12.5%), pneumonia (4.7%), pyoderma & cellulitis (3.1%) each, tinea, enteric fever, hepatitis A, sepsis, dysentery 1.6% each.

Shatha Hussain Ali et al,[22] study showed respiratory infection (33.3%) as most common infection followed by UTI (26.75%) Ekremah K. Shaker et al,[17] study showed similar results with UTI in 22 (32.3%) cases, URTI in 19 (28%) cases and no infection in 27 (39.7%) cases.

In the present study relapse was most common in children of > 5 years of age.

63.6% (n=28) were IFR and 36.4%(n=16) were FR. In the age group of < 5 years infrequent relapse 14(53.9%) were more common than frequent relapses 12(46.1%). In MN Sarker et al,[23] study most of the relapses were in < 5 years of age with 59% being FR and 41% were IFR. Morethan 90% of children with MCNS respond very well to steroids. Appropriate treatment with steroids during the 1st episode may decrease the relapses in children with MCNS. But due to prolonged usage of steroid

children are at risk of steroid toxicity which includes cushingoid facies, truncal obesity, hypertension. In the present study, among frequent relapse 32% showed response within 2 weeks and 68% showed response after 2 weeks. Among infrequent relapse 59.5% showed response within 2 weeks and 40.5% after 2 weeks.

There was significant association between steroid response and frequency of relapse.

The results were in agreement with the results of Shatha Hussain Ali et al,[22] study where there was significant association of relapse with steroid response where in infrequent relapse majority 94.3% had steroid response within 2 weeks, whereas in frequent relapsers 53.3% response occurred after 2 weeks.

UTI was one of the most common infections in nephrotic syndrome. Most of the times it is unrecognized due to younger age group having non-specific symptoms. It causes VUR and pyelonephritis and finally leads to renal scarring if left untreated. High index of suspicion of UTI among all children with NS is required for proper management of relapses with NS. In the present study, most common age group with UTI was < 6 years. There was no significant association between age and UTI. In a study done by Subinay Mandal et al,[16] and also in study done by LC Kundu et al,[12] there was no significant association between UTI and age of presentation. In general UTI is more common in females. But in this study male & female children with NS were equally affected with UTI.

In this study, we observed that majority of symptomatic UTI children (62.5%) were culture positive and only 10% of asymptomatic children were culture positive. There was a significant association between symptoms and culture and sensitivity (P Value 0.01).

In the present study, out of 18 cases of UTI, significant pyuria was seen in 6 cases. Out of 6 cases 83.3% were culture positive and remaining 16.7% cases were culture negative. Insignificant pyuria was seen in 12 cases. Out of 12 cases 75% were culture negative and remaining 25% were culture positive. In a study done by Shatha Hussain Ali et al,[25] results were consistent with the present study. 64.7% having significant pyuria had culture positivity.

Most of the studies revealed gram negative organisms as most common organism for UTI in children with UTI. Of that E. Coli was the most common organism. B Most Common Organism isolated in the current study population was E. Coli which was also observed in several other studies. Other organisms isolated in the study were Klebsiella, pseudomonas, and CONS. The present study showed that amikacin (66.75%), nitrofurantoin (37.5%), meropenem (37.5%) and piperacillin tazobactam (37.5%) were effective against most of the isolates.

In the present study culture isolates were resistant to ampicillin+ sulbactam, amoxicillin, cotrimoxazole. Shatha Hussain Ali et al,[25] study also revealed 100% resistance to ampicillin. All organisms isolated in this study were found to be sensitive to Amikacin and all were resistant to ampicillin+ sulbactam, amoxicillin, cotrimoxazole.

CONCLUSION

Nephrotic syndrome is a common renal disorder in pediatric population. Majority of children with SSNS have a very good outcome with complete remission in adulthood. Infections especially UTI is one of the most common causes of relapse in SSNS especially in frequent relapsers. Children with infections show unsatisfactory response to steroids. It is difficult to diagnose UTI with non-specific symptoms in young children with NS. Undiagnosed UTI may lead to pyelonephritis and chronic kidney disease due to scarring from VUR. High index of suspicion is required for accurate diagnosis of infections especially UTI in NS as UTI may be asymptomatic. Hence all children with NS should be investigated for UTI and treated appropriately. Early institution of appropriate antibiotics enables children to go into early remission with good outcome. All children with NS and their parents should be counselled in detail at 1st episode about early recognition of infections and relapses and importance of timely vaccination with an emphasis on special vaccines like PCV, influenza and varicella vaccines.

REFERENCES

1. Arvind Bagga, MuktaMantan. Nephrotic syndrome in children. Indian J Med Res 2005; 122:13-28.
2. Srivastava RN, Arvind Bagga. Pediatric Nephrology. 4th ed. New Delhi, India: Jaypee Brothers, Medical Publishers (P) Ltd; 2005. p. 161-200.
3. Robert M. Kliegman, Bonita F. Stanton, Joseph W. St Geme III, Nelson Textbook of Pediatrics. 20th edition. Philadelphia, Elsevier.2016, p. (2519-2526).
4. Ghai OP, Piyush Gupta, Paul VK. Essential Pediatrics. 6th ed. New Delhi: Ghai OP; 2004. p. 450-4.
5. 5.Arvind Bagga. Consensus statement on Management of Steroid Sensitive Nephrotic Syndrome Indian Pediatrics of Pediatrics 2001; 38:975-86.
6. P. Niaudet and O. Boyer, Idiopathic nephrotic syndrome in children; clinicalaspects. In: Pediatric Nephrology, E.D. Avner, W.E. Harmon
7. Vasudevan A, Mantan M, Bagga A. Management of edema in nephrotic syndrome. Indian Pediatr 2004;41
8. Edelmann CM, Bernstein J, Travis LB, Meadow SR. Pediatric Kidney disease, 2nd ed. Bronx (NY): Little Brown Publisher; 1992.p.1247-84.
9. Shao Na S, Bi- Li Z, et al. Spectrum and drug sensitivity of pathogenic bacteria in children with nephrotic syndrome complicated by urinary tract infection: an analysis of 97 cases. Chin J Contemp Pediatr, 2012,14(9) :657-660.
10. Adeleke SI and Asani MO. Urinary tract infection in children in children with nephrotic syndrome in kano, Nigeria. Annals of African Medicine,2009, Vol 8, No.1 :38-41.
11. Tanuka Barua, Razia Sultana, Fazal Karim Babul, Shahed Iqbal, Jhulan Das Sharma, Pradip Kumar Dutta. Urinary tract infection in nephrotic syndrome: A hospital based cross

sectional study. ChattagramMaa-O-Shishu Hospital medical college Journal 2016; 15(2):41-44.
12. LC Kundu, AK Saha, MK Hassan, A Kundu. Urinary tract infection in nephrotic syndrome. Faridpur Med. Coll. 2018;13(1):35-39.
13. Patricia Y. Gunawan, Adrian Umboh. The risk of urinary tract infection in children with nephrotic syndrome. PaediatrIndones, Vol 56, No. 4, July 2016.
14. Basu B, Baur D, Datta S, Bose M, Saha A (2015) Bacteriological Profile and sensitivity to antibiotics of common isolates responsible for urinary tract infection in nephrotic children. Int J Nephrol kidney failure 1(4):
15. Salarzaei et al., Prevalance of urinary tract infection in children with nephrotic syndrome. IJPSR, 2017; Vol. 8(7): 3.
16. Subinay mandal, Subhendu Samanta, SabyasachiBakshi, Devidutta Dash. Urinary tract infection in nephrotic syndrome in pediatric age group: a hospital based cross-sectional study. Int J ContempPediatr. 2020 Aug;7(8):1787-1791.
17. Shaker &Chaloobl (2020): UTIs in sensitive nephrotic syndrome. September 2020 Vol. 23 Issue 13B.
18. Ali, E. M. A., Elhadi, N. M., Abdelraheem, M. B., Ellidir, R. A., & Osman, G. (2018). Childhood Steroid Sensitive Nephrotic Syndrome: Characteristics and Predictors of Relapses; A study at a Single Center in Khartoum. Sudan Journal of Medical Sciences (SJMS), 13(3), 133-143.
19. Vishawanth, Devdas JM, Bukelo MJ. "Occurrence of urinary tract infection in children with nephrotic syndrome in a tertiary care hospital." Journal of Medical and Dental Sciences 2015; Vol 4, Issue 105, December 31; page: 17014-17016.
20. MuktaMantan, Srijan Singh. Infection Associated Relapses in Children with Nephrotic Syndrome: A Short-term Outcome Study. Saudi J Kidney Dis Transpl 2019; 30(6): 1245-1253.
21. 21.Rajendra NamdeoPatil, AnantGanpathBendale. A study of clinical profile and associated factors of nephrotic syndrome in children at tertiary health care center. MedPulse International Journal of Pediatrics. April 2017: 2(1): 05-07.
22. Shatha Hussain Ali, Zainab A. twfeekM.B. Ch. B, NarimanFahmi Ahmed Azat and AmerAbdulameer Hasan. Triggering factors for Relapses in Steroid Sensitive Nephrotic Syndrome. Int.J. Curr. Microbiol. App.Sci (2016) 5(8): 842-851.
23. MN Sarker, MMSU Islam, T Saad, FN Shoma, LS Sharmin, HA Khan, F Afrooz, LE Fatmi, A Alam, ASM Salimullah, MR Uddin, T Saha. Risk factor for relapse in childhood nephrotic syndrome – A Hospital Based Retrospective Study. Faridpur Med. Coll. J. 2012;7(1): 18-22.
24. Upma Narain, Arvind Gupta. Urinary tract infection in children with nephrotic syndrome. Pediatr Infect Dis J 2018; 37:144-146.
25. Shatha Hussain Ali, Sarah Hussain Cooley, Jabbar Salman Hassan and Ali Sadiq Hassan. Urinary tract infection in children with nephrotic syndrome. Int.J. Adv. Res. 6(4), 338-343.
26. Bakshi S, Samanta S. Urinary tract infection in nephrotic children: A cross- sectional study. J IntegrNephrolAndrol 2020: 7: 12-6.
27. Alpana Ohri, Richa Prakash, Vinit Pawar, Uma Ali. Clinical spectrum of several infections in nephrotic syndrome at a tertiary care Hospital, Mumbai. International J. of Healthcare and Biochemical Research. Volume 05, issue 02, January 2017, 8-18.
28. Khemchand N Moorani. Infections are common cause of relapse in children with nephrotic syndrome. Pak Paed J 2011:35(4):213-19.
29. Manish kumar, JaypalsingGhunawat, Diganta Saikia, Vikas Manchanda. Incidence and risk factors for major infections in hospitalized children with nephrotic syndrome. Braz. J. Nephrol. 2019; 41(4);526-533.
30. Prasun B. et al. Int J ContempPediatr. 2017 jan;4(1):57-61.
31. 31.Balaji J, Kumaravel KS, Punitha P, Sasikala K, Rameshbabu B. Risk factors for relapse in childhood steroid sensitive nephrotic syndrome. Indian J Child Health. 2017; 4(3): 322-326.
32. Raichandani H, Pandey AK, Chatterjee R, Jadhav J. Profile of infections in nephrotic syndrome patients of western rural Maharashtra. Med. Res. Chronicles. 2022nov.2;9(6):378-84.
33. 33.Mahvish et al. International Journal of Health and Clinical Research, 2021; 4(5):112-116.
34. Asaf et al. clinical pediatrics. Volume 59, issue 7, 692-698.
35. Kritimohan, omar, Balaram, Indurker, Shubham. Urinary tract infection in children with nephrotic syndrome. 2018/04/07.
36. B. Sreenivasa, C L Srinivasamurthy, K Raghavendra, S P Basavanthappa, Rajathpejaver, HareeshVardhanJadala, SomarouthuRajashekar. Urinary tract infection at presentation of nephrotic syndrome: A clinical evaluation. Indian journal of child health. Vol.2 no. 1(2015).
37. P Senguttuvan, K Ravanan, N Prabhu, V Tamilarasi. Infections encountered in childhood nephrotics in a pediatric renal unit. Indian J Nephrol 2004; 14: 85-88.
38. Bitzan M, Glomerular Diseases. In : Manual of Paediatric Nephrology, K. Phadke, P. Goodyer, and M. Bitzan, Eds. Springer, London, UK, 2014. Pp. 141-229.
39. Patricia. M. Tille, Bailey and Scott's Diagnostic Microbiology, Thirteenth edition,2014 Elsvier Mosby pg no:62-76.
40. 40.Baird D Staphylococcus: Cluster forming Grampositive cocci. In: ColleeJG, FraserAG, MarimionBP, SimmonsA, editors. Mackie and McCartney Practical Medical Microbiology. 14th ed. Delhi: Churchill Livingstone Elsevier: 2012. P.245-258.