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Urinary Tract Infection As A Precipitating Factor For Relapse In Nephrotic Syndrome.

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ABSTRACT

The nephrotic syndrome (NS) is a common childhood illness characterized by massive proteinuria, hyperlipidaemia, and hypoalbuminemia. It is a disease of relapse, and therefore, it is a major problem to manage cases with frequent relapses. Prediction and prevention of risk factors is the key to successful management of childhood NS. To determine urinary tract infection as a precipitating factor for relapse in nephrotic syndrome. Primary objective was to assess the incidence of urinary tract infection as precipitating factor in cases of nephrotic syndrome relapse. Children with relapse of nephrotic syndrome will be admitted in paediatric ward government rajaji hospital. Patient details were collected regarding nephrotic syndrome relapse such as the number of relapse, frequent or infrequent relapse and details regarding previous treatment such as steroid dependent, steroid resistant or steroid sensitive nephrotic syndrome will be collected. In this study, 95 nephrotic syndrome relapse children were enrolled, majority had upper respiratory tract infection 56 (58.9%) and followed by urinary tract infection 35 (36.8%) and then minor infection like gastrointestinal causes AGE 3 (3.2%), SBP 1 (1.1%) and other causes. Organism for urine culture were identified - Ecoli identified in 17 children (17.9%), followed by Klebsiella in 9 children (9.5%), NFGNB in 3 children (3.2%), staphylococcus in 2 children (2.1%), pseudomonas in 1 children (1.1%) and proteus in 1 children (1.1%). And drug sensitivity pattern shows gentamicin was sensitive in 20 children (60.6%) followed by nitrofurantoin in 18 children (54.5%), cefotaxime in 2 children (6.1%) and ceftazidime in 1 child (3%). Those whose relapse were precipitated by urinary tract infection are more prone for frequent relapse compare with other. upper respiratory tract infection was the most common precipitating factor for relapse of nephrotic syndrome followed by urinary tract infection. In nephrotic syndrome relapse children, urinary tract infections were commonly underdiagnosed. Therefore urinary tract infection in these children should be diagnosed by urine culture and appropriate antibiotic acting on urinary tract pathogens should be prescribed. Thus early identification and treatment of urinary tract infection is essential part of management of nephrotic syndrome.

Keywords: Nephrotic syndrome ,urinary tract infection, frequent relapse, precipitating factor ,Culture organism and drug sensitivity

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INTRODUCTION

Nephrotic syndrome is the glomerular disease of the renal system, clinically manifested as heavy proteinuria (Nephrotic range proteinuria). Nephrotic range of proteinuria is defined as proteinuria $> 3.5\text{g}/24\text{hr}$ or a urine protein: creatinine ration >2 [1]. The triad of nephrotic syndrome is nephrotic range proteinuria, hypoalbuminemia (serum albumin $<2.5\text{g}/\text{dl}$), presence of clinical edema and hyperlipidaemia (serum cholesterol $> 200\text{mg}/\text{dl}$). as per nelson text book of paediatrics [2]. But in recent guidelines all these values are varying, and hypercholesterolemia was excluded. Nephrotic syndrome affects 1 to 3 per 1laks children less than 16 years of age, high risk of mortality if left untreated (mostly due to infections).80% of the nephrotic syndromes are corticosteroid responders [3]. Most of the nephrotic syndrome are idiopathic nephrotic syndrome [4]. Glomerular lesions associated with idiopathic nephrotic syndrome include minimal change disease which is most common followed by focal segmental glomerulosclerosis, membranoproliferative glomerulonephritis, C3 glomerulopathy and membranous nephropathy. [5]Certain genetic syndrome associated with nephrotic syndrome like isolated congenital nephrotic syndrome of the finish type & syndrome associated as Denys – Drash syndrome, Pierson syndrome, nail – patella syndrome, Frasier syndrome, Schinke immunosseous dysplasia, epidermolysis bullosa + FSGS, Galloway mowat syndrome and childhood onset of genetic like autosomal recessive steroid resistance or sensitive nephrotic syndrome all these can occur [6,7].

MATERIALS AND METHODS

This Observational study was done at paediatric ward of Institute of child health and research centre, Madurai medical college, Madurai in the year 2022.

Inclusion Criteria

Nephrotic syndrome presenting with relapse.

Exclusion Criteria

First episode of nephrotic syndrome. Congenital nephrotic syndrome. Child started on antibiotics before evaluation. Nephrotic syndrome with anatomical renal abnormality. Patient with relapse of nephrotic syndrome will be admitted in paediatric ward. Details regarding nephrotic syndrome relapse such as the number of relapses, frequent or infrequent relapse and details regarding previous treatment such as steroid dependent, steroid resistant or steroid sensitive nephrotic syndrome will be collected. History regarding foci of infection such as urinary tract infection, upper respiratory tract infection, gastrointestinal tract infection, skin infection, viral exanthem that might act as a precipitating factor will be collected. Finally, Urine sample will be collected from all these children. Urine analysis will be done by dipstick method for albumin, nitrite reductase and leucocyte esterase for evidence of urinary tract infection.

Statistical Method

Data were entered in Microsoft excel and statistical package for social science (SPSS) version 25 was used for analysis. Descriptive data were analysed in the form of frequency and percentage. Categorical variables were mentioned as frequency distribution and percentage. Data were represented by tables and bar chart wherever relevant. Chi square test and Fischer exact test was used to find association between categorical variables. P value of less than 0.005 was considered as significant.

RESULTS

Among the study participants, majority (52.6%) were from 1 to 5 years followed by 37.9% in 6 to 10 years. 9.5% were from 11 to 12 years of age. Among the study participants, majority (53.7%) were male children and 46.3% were female children.

Chart 1: Age group of the study participants

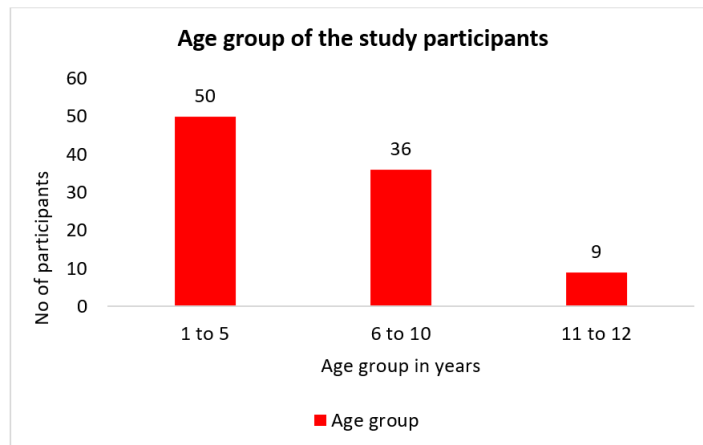


Chart 2: Relapse of the study participants

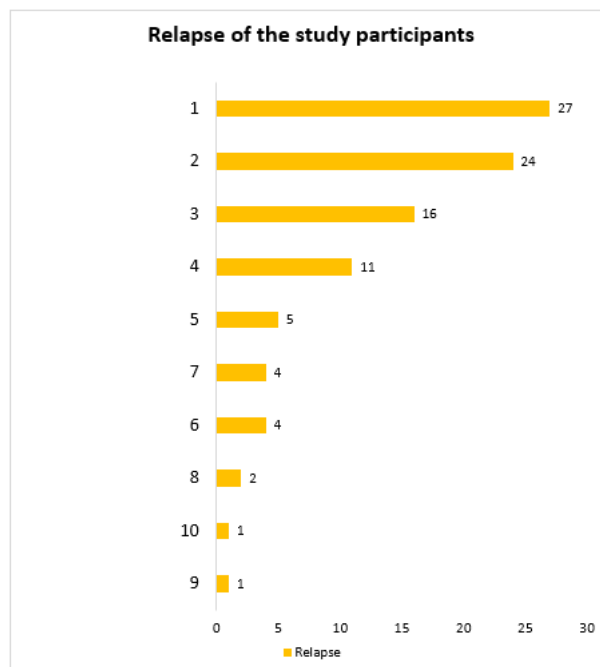


Chart 3: Symptoms of UTI of the study participants

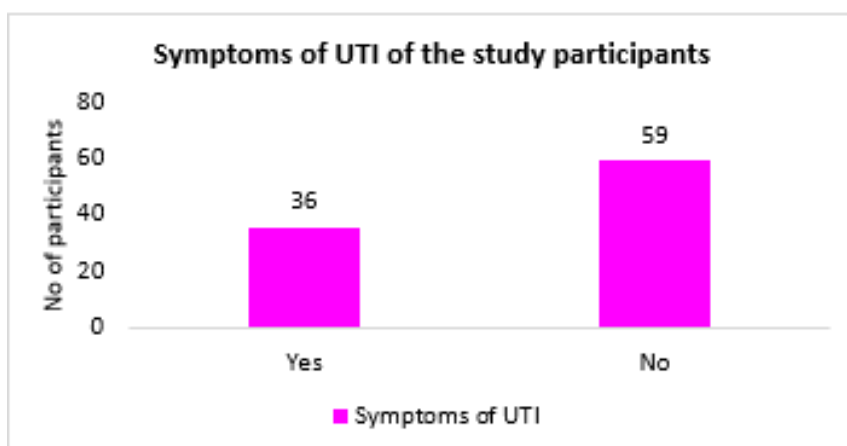


Chart 4: Nitrite reductase test of the study participants

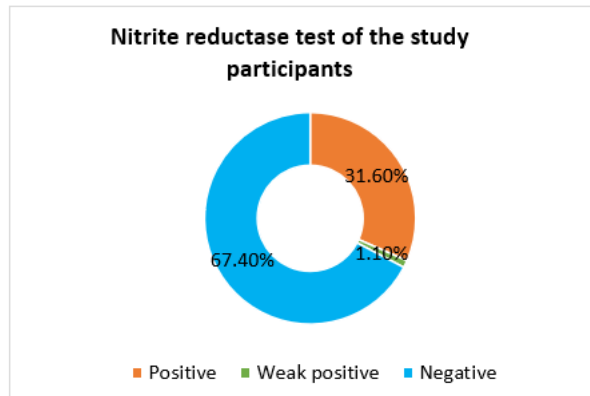


Chart 5: Leukocyte esterase test of the study participants

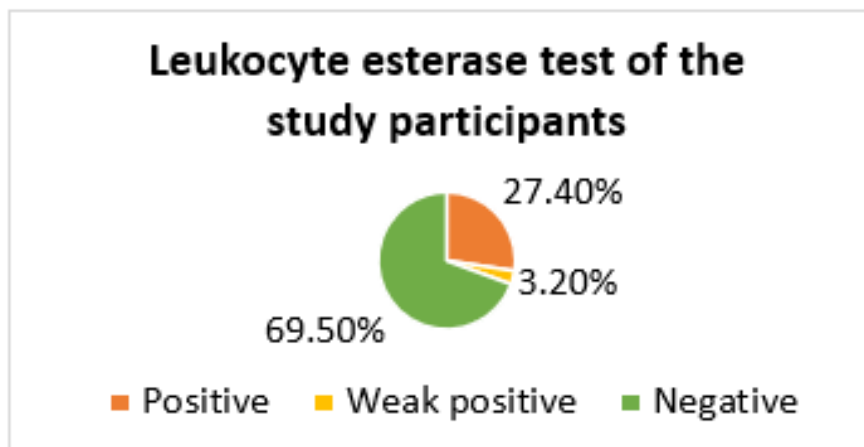
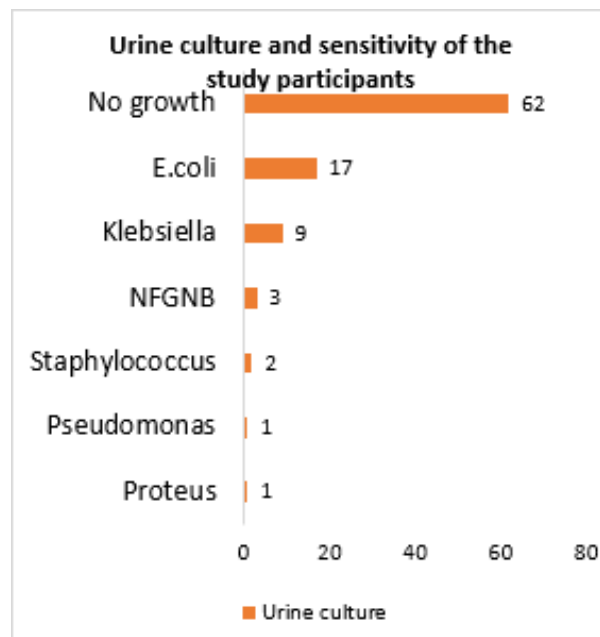


Chart 6: Urine culture and sensitivity of the study participants



In urine culture, among the study participants, 62 had no growth, 17 had E.coli, 9 had klebsiella, 3 had NFGNB, 2 had staphylococcus, 1 had proteus and 1 had pseudomonas.

Chart 7: Precipitating factor for relapse of the study participants

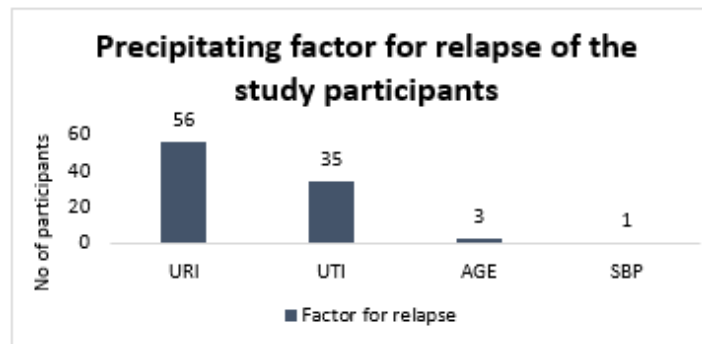
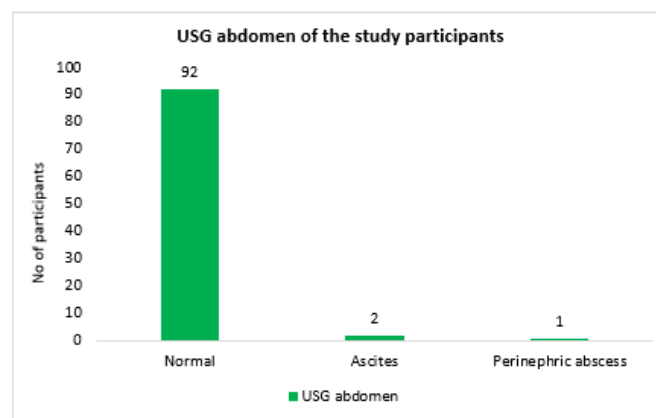
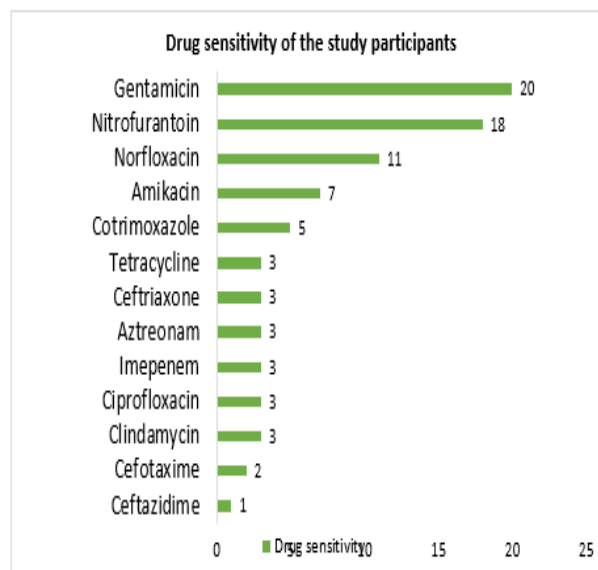


Chart 7: USG abdomen of the study participants



In ultrasound abdomen, among the study participants, 92 had normal study, 2 had ascites and 1 had perinephric abscess.

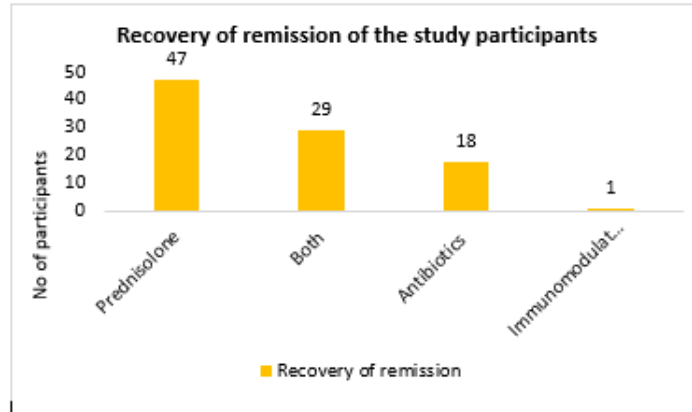
Chart 8: Drug sensitivity of the study participants



Among the drug sensitivity pattern, gentamicin had sensitivity in 20 participants, Nitrofurantoin had sensitivity in 18 participants, Norfloxacin had sensitivity in 11 participants, Amikacin had sensitivity in 7 participants, Cotrimoxazole had sensitivity in 5 participants, Clindamycin had sensitivity in 3

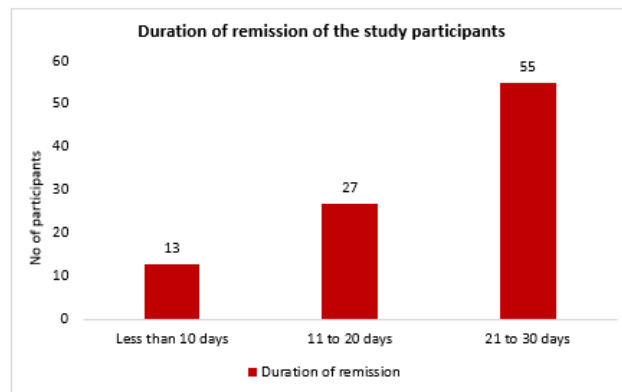
participants, Ciprofloxacin had sensitivity in 3 participants, Imepenem had sensitivity in 3 participants, Aztreonam had sensitivity in 3 participants, Ceftriaxone had sensitivity in 3 participants, Tetracycline had sensitivity in 3 participants, Cefotaxime had sensitivity in 2 participants and Ceftazidime had sensitivity in 1 participant.

Chart 9: Recovery of remission of the study participants



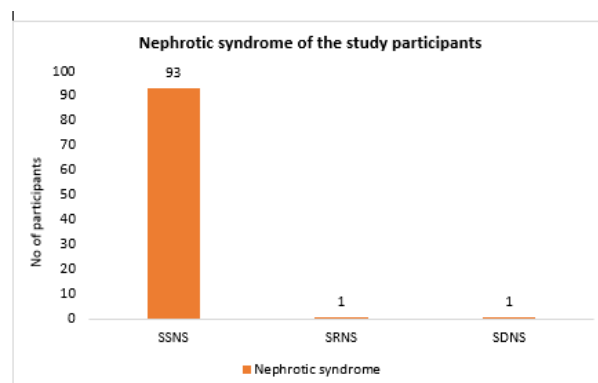
Among the study participants, 47 participants recovered with prednisolone, 18 participants with antibiotics, 29 participants with both and 1 participant recovered with Immunomodulator, antibiotic and prednisolone.

Chart 10: Duration of remission of the study participants



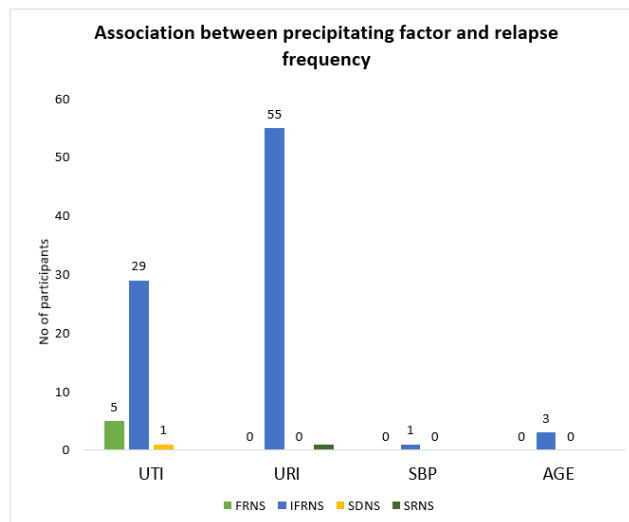
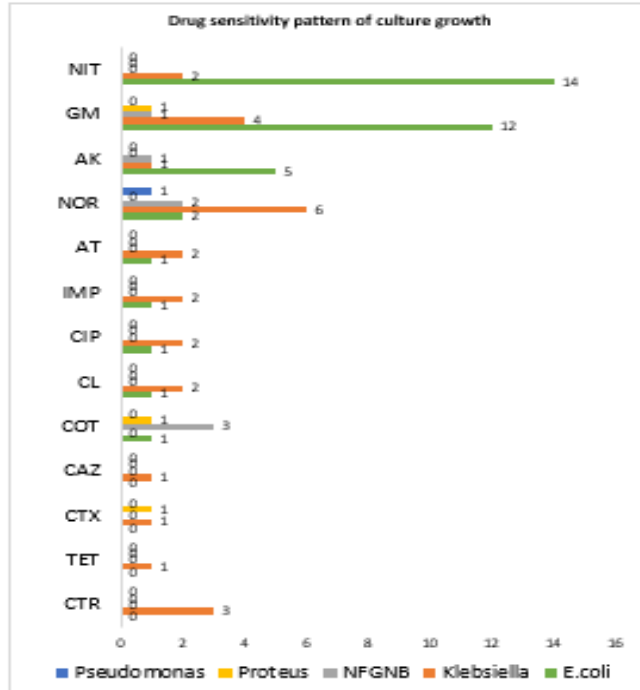
Among the study participants, 13 children had duration of remission less than 10 days, 27 children had duration of remission from 11 to 20 days, 55 children had duration of remission from 21 to 30 days.

Chart 11: Nephrotic syndrome of the study participants



Among the study participants, 93 participants had SSNS, 1 participant had SRNS and 1 participant had SDNS.

Chart 12: Drug Sensitivity



E.coli had sensitivity in 12 participants for gentamicin, 14 participants for Nitrofurantoin, 2 participants for Norfloxacin, 5 participants for Amikacin, 1 participant for Cotrimoxazole, 1 participant for Clindamycin, 1 participant for Ciprofloxacin, 1 participant for Imepenem, 1 participant for Aztreonam. Klebsiella had sensitivity in 4 participants for gentamicin, 2 participants for Nitrofurantoin, 6 participants for Norfloxacin, 1 participants for Amikacin, 2 participants for Clindamycin, 2 participants for Ciprofloxacin, 2 participants for Imepenem, 2 participants for Aztreonam, 3 participants for Ceftriaxone, 1 participant for Tetracycline, 1 participant for Cefotaxime, 1 participant for Ceftazidime. NFGNB had sensitivity in 1 participant for gentamicin, 2 participants for Norfloxacin, 1 participant for amikacin, 3 participants for Cotrimoxazole. Proteus had sensitivity to 1 participant for gentamycin, 1 participant for cotrimoxazole and 1 for Cefotaxime. Pseudomonas had sensitivity to 1 participant for norfloxacin. Staphylococcus had sensitivity to 2 participants for gentamicin, 2 participants for Nitrofurantoin, 2 participants for Tetracycline.

DISCUSSION

In this study was conducted among 95 children with nephrotic syndrome with age group of 1 to 12 years in Government Rajaji Hospital, Madurai. Study aimed to determine urinary tract infection as a precipitating factor for relapse in nephrotic syndrome. The primary objective was to assess the incidence of urinary tract infection as precipitating factor in case of nephrotic syndrome relapse and secondary objective were to identify the common organism causing urinary tract infection and its drug sensitivity pattern in the given study population [8]. Among the study participants majority were from 1 to 5 years then 6 to 10 years of age fewer belongs to 11 to 12 years of age. In our study, 36 children had Urinary Tract Infection symptoms, in which 30 children were positive for nitrite reductase test and 26 children were positive for leukocyte esterase test [9]. Among 36 children with urinary tract infection symptoms, 33 children had culture positive Urinary Tract Infection. Upper respiratory tract infection was first most common triggering factor followed by urinary tract infection. In this study majority had upper respiratory tract infection 56 (58.9%) and followed by urinary tract infection 35 (36.8%) and then minor infection like gastrointestinal causes AGE 3 (3.2%), SBP 1 (1.1%) and other causes. common organism identified in urinary tract infection were E.coli followed klebsiella, enterococcus and proteus.[10] In our study, E.coli identified in 17 children (17.9%) , followed by klebsiella in 9 children (9.5%), NFGNB in 3 children (3.2%), staphylococcus in 2 children (2.1%), pseudomonas in 1 children (1.1%) and proteus in 1 children (1.1%). 66% of urinary tract infection children showed increased renal echo in ultrasonography. In our study, among 36 children with urinary tract infection, 1 child had perinephric abscess in ultrasonography and other children had normal study. In this study, among 36 children with urinary tract infection in nephrotic syndrome relapse, gentamicin was sensitive in 20 children (60.6%) followed by nitrofurantoin in 18 children (54.5%), cefotaxime in 2 children (6.1%) and ceftazidime in 1 children (3%) [11]. Fluroquinolones and cefepime was the empirical antibiotics used in nephrotic relapse children with urinary tract infection [12]. In our study, empirical antibiotics used in nephrotic syndrome children with urinary tract infections were cefexime and ceftriaxone. In this study, the drug sensitivity patterns of the urine culture in relation with organism, E.coli was most sensitive to Nitrofurantoin in 14 children followed by gentamicin in 12 children and Amikacin in 5 children and Norfloxacin in 2 children. Klebsiella was most sensitive to Norfloxacin in 6 children, gentamycin in 4 children, Nitrofurantoin in 2 children, Aztreonam in 2 children and Imepenam in 2 children [14]. NFGNB was mostly sensitive to Cotrimoxazole in 3 children and Norfloxacin in 2 children. Proteus very few sensitive to Gentamycin in 2 children and Cotrimoxazole in 1 child. Pseudomonas only sensitive to Norfloxacin in 1 child. Staphylococcus was mostly sensitive to Gentamycin in 2 children, Nitrofurantoin in 2 children and Tetracycline in 2 children [15]. The outcome of the study is to reduce the hospital stay / attaining early remission. 47 were required only prednisolone for their remission, 29 were required both IV prolonged antibiotic and prednisolone to control infection and needed of prednisolone to attain remission [16]. Only few 18 children, attained remission with only antibiotics. Children with early remission within 10 days were 13 children only, majority attain remission between 20 to 30 days of relapse (55), those who were using appropriate antibiotics and steroid attained remission earlier [17]. Majority the age of onset were 1 to 4 years of age and frequent relapse belongs to this groups. Among the frequent relapse urinary tract infections was the important predisposing factor. Urinary tract infection remains mostly underdiagnose in these patients thus leading to prescription of antibiotics that does not act on urinary tract or on those organism causing urinary tract infection. [18] These condition leads to prolonged hospital stay and increased time taken to achieve remission and prolonged administration of steroids. So, the identification of infective focus triggering relapse in nephrotic syndrome patients of key importance in treating them and help them to attain remission earlier avoiding prolonged administration of steroids. Treatment of underlying infection with appropriate antibiotics thus helps in attaining remission earlier [19,20].

CONCLUSION

From this study, we conclude that upper respiratory tract infection was the most common precipitating factor for relapse of nephrotic syndrome followed by urinary tract infection. In nephrotic syndrome relapse children, Urinary tract infection were commonly underdiagnosed. Therefore urinary tract infection in these children should be diagnosed by urine culture and appropriate antibiotic acting on urinary tract pathogens should be prescribed. Identification of infective focus in nephrotic syndrome relapse children and treating them with appropriate antibiotics helps in attaining remission earlier and avoid prolonged administration of steroids and prolonged hospitalization. Thus early identification and treatment of urinary tract infection is essential part of management of nephrotic syndrome.

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