**CHAPTER FOUR**

**4.0 Results**

Patients’ Sociodemographic Characteristics

The data from all 53 patients enrolled in the study were complete and used for analysis, giving a response rate of 100%. The patients’ ages ranged from 18 to 50, with a median age of 25.00 years (IQR = 10). The majority, 28 (52.8%) of the 53 patients, were in the 20-29 age group, followed by those in the 30-39 age group (22.6%). Only a few patients were aged ≥40 years.

The majority, 37 (69.8%) of the 53 patients, were males. The majority of patients were single (64.2%), had formal education (64.2%), and resided in Sokoto State (62.3%).

# Table 1: Sociodemographic Characteristics of Adult Patients with Nephrotic syndrome (NS) in Usmanu Danfodiyo University Teaching Hospital Sokoto, Nigeria (n = 53)

|  |  |  |
| --- | --- | --- |
| **Sociodemographic variables** | **Frequency (n = 53)** | **Percentage (%)** |
| **Age group (years)** |  |  |
| <20 20 – 29 30– 39 ≥ 40 | 10 28 12 3 | 18.9 52.8 22.6 5.7 |
| **Gender** |  |  |
| Male Female | 37 16 | 69.8 30.2 |
| **Marital status** |  |  |
| Single Married | 34 19 | 64.2 34.8 |
| **Level of education** |  |  |
| Formal education No formal education | 34 19 | 64.2 35.8 |
| **State of residence** |  |  |
| Sokoto Kebbi Zamfara Niger | 32 14 3 3 | 62.3 26.4 5.7 5. |

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# Table 3 highlights the medical history of the participants in the study. A total of 53 patients were assessed, and the results reveal key clinical characteristics. Frothy urine was reported by 94.3% (n=50) of the participants, indicating it was a predominant symptom, while only 5.7% (n=3) did not experience frothy urine. All 53 participants (100%) reported body swelling, making it a universally observed symptom in the group. Decline in urine output was noted by 24.5% (n=13) of patients, while 75.5% (n=40) did not report any decrease in urine output. Notably, hypertension and diabetes were absent in this study cohort, as 100% of the participants reported no history of either condition. Regarding allergies, only 5.6% (n=3) had a history of allergies, with the vast majority, 94.4% (n=50), not reporting any such history. A history of NSAID use was recorded in 37.7% (n=20) of the participants, while 62.3% (n=33) did not report NSAID use. Bone pain was reported by 3.8% (n=2) of the participants, and 7.5% (n=4) of the patients experienced hair loss. A family history of similar problems was reported by 1.9% (n=1), while 98.1% (n=52) did not have a family history of similar conditions.

# Table 3. Clinical History of Adult Patients with Nephrotic syndrome (NS) in Usmanu Danfodiyo University Teaching Hospital Sokoto, Nigeria (n = 53)

|  |  |  |
| --- | --- | --- |
|  | | |
| **Medical History** | **Frequency (n=53)** | **Percentage (%)** |
|  |  |  |
| **Frothy urine** |  |  |
| Yes | 50 | 94.3 |
| No | 3 | 5.7 |
| **Body swelling** |  |  |
| Yes | 53 | 100 |
| **Decline in urine output**  Yes  No | 13  40 | 24.5  75.5 |
| **Hypertension** |  |  |
| No | 53 | 100 |
| **Diabetes** |  |  |
| No | 53 | 100 |
| **Hx\_of\_allergies** |  |  |
| Yes | 3 | 5.6 |
| No | 50 | 94.4 |
| **Hx\_NSAIDs use** |  |  |
| Yes | 20 | 37.7 |
| No | 33 | 62.3 |
| **Bone\_pain** |  |  |
| Yes | 2 | 3.8 |
| No | 51 |  |
| **Hair loss** |  |  |
| Yes | 4 | 7.5 |
| No | 49 | 92.5 |
| **Family hx \_similar problem** |  |  |
| Yes | 1 | 1.9 |
| No | 52 | 98.1 |

The association between examination findings and the prevalence of lupus nephritis (LN) is presented in Table 6. There was a statistically significant association between the prevalence of LN and body swelling (p < 0.001), with 100% (n=50) of patients who had body swelling diagnosed with LN, compared to none (0%) of those without body swelling. Additionally, the presence of Xanthelasma was associated with a lower likelihood of LN, as only 13.2% (n=7) of patients with Xanthelasma had LN, compared to 86.8% (n=46) of those without it.

Regarding blood pressure, 79.2% (n=52) of participants had normal blood pressure at presentation, with only 20.8% (n=11) presenting with high blood pressure. The mean systolic and diastolic blood pressure values were higher in patients with LN compared to those without, although the statistical significance of this difference was not explicitly tested in this table. The majority of patients had normal blood pressure at biopsy (98.1%), with only 1.9% presenting with high blood pressure.

As for body mass index (BMI), there was no statistically significant difference between the BMI of patients with LN (mean = 23.0 ± 4.3 kg/m²) and those without LN (mean = 24.2 ± 3.3 kg/m²; p = 0.28). This suggests that BMI did not significantly correlate with the prevalence of LN in this study sample. Overall, body swelling, Xanthelasma, and blood pressure levels at presentation and biopsy showed varying associations with LN, but the relationship with BMI was not statistically significant.

**Table 4. Examination findings of Adult Patients with Nephrotic syndrome (NS) in Usmanu Danfodiyo University Teaching Hospital Sokoto, Nigeria (n = 53)**

|  |  |  |
| --- | --- | --- |
| **Examination Findings** | **Frequency (n=53)** | **Percentage (%)** |
|  |  |  |
| **Body swelling** |  |  |
| Yes  No | 50  3 | 94.3  5.7 |
| **Leukonychia** |  |  |
| Yes | 1 | 1.9 |
| No | 52 | 98.1 |
| **Xanthelesma** |  |  |
| Yes | 7 | 13.2 |
| No | 46 | 86.8 |
| **Muerckes\_line** |  |  |
| Yes | 2 | 3.8 |
| No | 51 | 96.2 |
| **BP at presentation**  Normal  High | 52  11 | 79.2  20.8 |
| **BP at biopsy**  Normal  High | 52  1 | 98.1  1.9 |
| **BMI (Kg/m2)**  Underweight  Normal  Overweight  Obesity | 1  40  11  1 | 1.9  75.5  20.7  1.9 |

|  |  |  |
| --- | --- | --- |
| **Variables** | **Range** | **Median (IQR)** |
| Systolic at presentation | 96 – 150 | 120(20) |
| Diastolic at pre4sentation | 60 -100 | 80 (14) |
| Systolic at biopsy | 100 – 156 | 113 (14) |
| Diastolic at biopsy | 56 – 91 | 72(10) |

The result in Table 7 showed the distribution of various laboratory variables among the 53 patients in the study. A statistically significant association was found between the severity of **proteinuria** and lupus nephritis (LN), with the majority of patients (94.4%) showing 3+ proteinuria. **Hematuria** was also prevalent, with 70% of patients having either 1+ or 2+ blood in their urine, indicating significant renal involvement. Additionally, **glycosuria** was observed in 13.2% of the patients, with 9.4% showing mild glycosuria (1+) and 3.8% moderate glycosuria (2+).

Regarding **positive serology**, 7.5% of patients tested positive for HBsAg and 3.8% for Anti-HCV, suggesting some viral co-infection in the cohort. Although no patients were positive for RVS, 5.7% of patients tested positive for ANA, a marker commonly associated with autoimmune diseases like SLE.

When examining **immunohistochemistry** results, a higher proportion of patients tested positive for **IgM** (37.7%) and **IgG** (24.5%), which are indicative of immune system activation. **IgA** positivity was present in 20.8% of patients, while **C3** positivity was noted in 15.1%, suggesting ongoing complement activation, which may be related to disease progression.

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# Table 4. laboratory findings of Adult Patients with Nephrotic syndrome (NS) in Usmanu Danfodiyo University Teaching Hospital Sokoto, Nigeria (n = 53)

|  |  |  |
| --- | --- | --- |
| **Laboratory Variables** | **Frequency (n-53)** | **Percentage (%)** |
|  |  |  |
| **Protenuria** |  |  |
| 3+ | 50 | 94.4 |
| 4+ | 3 | 5.6 |
| **Heamturia** |  |  |
| negative | 16 | 30.2 |
| 2+ | 19 | 35.8 |
| 1+ | 18 | 34.0 |
| **Glycosuria** |  |  |
| neg | 46 | 86.8 |
| 1+ | 5 | 9.4 |
| 2+ | 2 | 3.8 |
| **Positive serology** |  |  |
| HbsAg | 4 | 7.5 |
| Anti\_HCV | 2 | 3.8 |
| RVS | 0 | 0 |
| ANA | 3 | 5.7 |
| **Positive immunohistochemistry** |  |  |
| IgA | 11 | 20.8 |
| IgM | 20 | 37.7 |
| IgG | 13 | 24.5 |
| C3 | 8 | 15.1 |

This table presents the results of immunoperoxidase staining for immunoglobulins IgA, IgM, IgG, and complement component C3 in patients with different histological patterns of nephrotic syndrome, including Minimal Change Disease (MCD), Focal Segmental Glomerulosclerosis (FSGS), Membranous Nephropathy (MN), Membranoproliferative Glomerulonephritis (MPGN), Lupus Nephritis (LUPUS), and IgA Nephropathy (IgA-N). The table shows the frequency and percentage of positive and negative results for each marker in each histological pattern, with the test of significance provided as Fisher's Exact Test (FE).

For IgA, a statistically significant association was found with a p-value of 0.009. The highest percentage of IgA positivity was observed in Lupus Nephritis, with 27.3% of patients testing positive for IgA. In contrast, other histological patterns showed lower positivity rates, with MCD having 36.4% positive and FSGS having 18.2% positive. This suggests that IgA staining is more commonly associated with Lupus Nephritis compared to other nephrotic syndrome patterns.

For IgM, a p-value of 0.043 was obtained, indicating a statistically significant difference across the histological patterns. MCD had the highest percentage of IgM positivity, with 45% of patients testing positive, while FSGS had 30% positive, and other groups like MN and MPGN showed much lower rates of positivity. This suggests that IgM is particularly more prevalent in MCD, and its presence may play a role in the disease process in this pattern.

For IgG, the p-value of 0.001 indicates a strong statistical association with histological patterns. In this case, patients with MN showed a higher rate of IgG positivity, with 30.8% of patients testing positive. Lupus Nephritis also showed a relatively high rate of positivity, at 23.1%. This suggests that IgG may be more involved in the pathogenesis of MN and Lupus Nephritis, highlighting a potential role for IgG in the immune mechanisms of these diseases.

C3 staining also showed a highly significant result, with a p-value of 0.0001. Lupus Nephritis had the highest percentage of C3 positivity, with 37.5% of patients testing positive. This finding is significant because it suggests that complement activation, as indicated by C3 positivity, plays an important role in the pathogenesis of Lupus Nephritis, more so than in other nephrotic syndrome patterns, where the presence of C3 positivity was much lower.

Histological pattern

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Immunoperoxidase**  **Staining** | **MCD**  **n(%)** | **FSGS**  **n(%)** | **MN**  **n(%)** | **MPGN**  **n(%)** | **LUPUS**  **n(%)** | **IgA-N**  **n(%)** | **Test of significance** |
| **IgA**  Pos  Neg | 4(36.4)  16(38.1) | 2(18.2)  17(40.5) | 1(9.1)  4(9.5) | 0(0)  5(11.9) | 3(27.3)  0(0) | 1(9.1)  0(0) | FE- 13.189  *p*= 0.009 |
| **IgM**  Pos  Neg | 9(45.0)  11(33.3) | 6(30.0)  13(39.4) | 1(5.0)  4(15.2) | 0(0)  5(15.0) | 3(15.0)  0(0.0) | 1(5.0)  0(0) | FE- 9.948  *p*= 0.043 |
| **IgG**  Pos  Neg | 4(30.8)  16(40.0) | 1(7.7)  18(5.3) | 4(30.8)  1(2.5) | 1(7.7)  4(10.0) | 3(23.1)  0(0) | 0(0)  1(2.5) | FE- 18.576  *p*= 0.001 |
| **C3**  Pos  Neg | 0(0)  20(44.4) | 0(0)  19(42.2) | 2(25.0)  3(6.7) | 2(25.0)  3(6.7) | 3(37.5)  0(0) | 1(12.5)  0(0) | FE- 26.790  *p*= 0.0001 |

Table 9 presents a summary of various clinical parameters measured in the study participants, including both haematological and biochemical values.

The mean urine protein-to-creatinine ratio (UPCR) was 8.3 ± 4.5 mg/mg, with a range from 3.7 to 31.0, indicating a moderate level of proteinuria. The mean urea level was 5.8 ± 2.6 mmol/L, with values ranging from 2.3 to 14.1 mmol/L. The median creatinine level was 0.9 (IQR: 0.5), reflecting kidney function, with a range from 0.3 to 2.7 mg/dL. The mean estimated glomerular filtration rate (eGFR) was 102.8 ± 31.7 mL/min/1.73m², with a wide range of 31.7 to 158.0 mL/min/1.73m², suggesting varying levels of kidney function across the sample.

Regarding lipid profile, the mean total cholesterol level was 306.1 ± 90.4 mg/dL, with a range of 120.0 to 531.0 mg/dL, and triglycerides had a mean of 215.1 ± 118.2 mg/dL, ranging from 51.0 to 480.0 mg/dL. High-density lipoprotein (HDL) cholesterol had a mean of 61.6 ± 80.7 mg/dL, while low-density lipoprotein (LDL) cholesterol averaged 209.7 ± 91.8 mg/dL, with values ranging from 18.0 to 455.0 mg/dL.

Fasting blood sugar had a mean of 4.8 ± 0.5 mmol/L, with values ranging between 3.8 and 5.6 mmol/L, indicating relatively stable glucose levels. The total protein and serum albumin levels were 4.8 ± 0.9 g/dL and 2.2 ± 0.7 g/dL, respectively, with serum albumin being relatively low, suggesting potential issues with protein loss, possibly due to nephropathy.

The prothrombin time had a median of 11 seconds (IQR: 1), and the international normalized ratio (INR) had a median of 1 (IQR: 0.2), both of which are indicative of normal coagulation function. Platelet count averaged 353.0 ± 94.5 ×10⁹/L, and haemoglobin levels were 10.9 ± 2.3 g/dL, with values ranging from 6.0 to 16.0 g/dL, reflecting a moderately low haemoglobin level. The mean haematocrit was 32.8 ± 7.0%, with a range from 18.0% to 48.0%, further suggesting possible anaemia.

The number of glomeruli, which reflects kidney structure, had a mean of 20.0 ± 14.0, ranging from 7.0 to 70.0, possibly indicating varying levels of kidney damage or glomerular involvement. The mean weight of the participants was 62.2 ± 7.8 kg, and the mean body mass index (BMI) was 23 ± 2.8 kg/m², with values ranging from 17 to 30 kg/m², suggesting that most participants were within a normal weight range.

# Table 5. laboratory findings of Adult Patients with Nephrotic syndrome (NS) in Usmanu Danfodiyo University Teaching Hospital Sokoto, Nigeria (n = 53)

|  |  |  |
| --- | --- | --- |
| **Parameters** | **Range** | **Mean +-SD** |
| UPCR (mg/mg) | 3.7-31.0 | 8.3 ±4.5 |
| Urea (mmol/L) | 2.3 -14.1 | 5.8 ± 2.6 |
| Creatinine (mg/dL) | 0.3 -2.7 | Median (IQR)  0.9 (0.5) |
| eGFR (mL/min/1.73m2) | 31.7 – 158.0 | 102.8 ± 31.7 |
| Total cholesterol (mg/dL) | 120.0 – 531.0 | 306.1 ± 90.4 |
| Triglycerides (mg/dl) | 51.0 – 480.0 | 215.1 ± 118.2 |
| HDL cholesterol (mg/dL) | 16.0 – 621.0 | 61.6 ± 80.7 |
| LDL cholesterol (mg/dL) | 18.0 – 455.0 | 209.7 ± 91.8 |
| Fasting blood sugar (mmol/L) | 3.8 – 5.6 | 4.8 ± 0.5 |
| Total protein (g/dL) | 2.5 – 6.9 | 4.8 ± 0.9 |
| Serum albumin(g/dL) | 1.2 – 3.4 | 2.2 ± 0.7 |
| Prothrombin time (seconds) | 10.0 – 14.0 | Median (IQR)  11 (1) |
| INR | 0.8 – 7.4 | Median (IQR)  1 (0.2) |
| Platelet (/L) | 117.0 – 603.0 | 353.0 ± 94.5 |
| Hemoglobin (g/dL) | 6.0 – 16.0 | 10.9 ± 2.3 |
| Hematocrit (%) | 18.0 – 48.0 | 32.8 ± 7.0 |
| Number of Glomeruli | 7.0-70.0 | 20.0 ±14.0 |
| Weight (Kg) | 41- 87 | 62.2 ± 7.8 |
| BMI (Kg/m2) | 17- 30 | 23 ± 2.8 |

# The table presents kidney ultrasound and histology findings in a sample of 53 individuals. All 53 participants had both kidneys, representing 100% of the sample. The majority, 98.1% (52 out of 53), had normal kidney sizes, while 1.9% (1 out of 53) had enlarged kidneys. In terms of echogenicity, 13.2% (7 out of 53) had increased echogenicity, which could indicate kidney damage or inflammation, while 86.8% (46 out of 53) had normal echogenicity.

# When assessing corticomedullary differentiation, 88.7% (47 out of 53) had good differentiation, indicating a clear distinction between the cortex and medulla of the kidneys, while 11.3% (6 out of 53) had poor corticomedullary differentiation, potentially signaling kidney pathology.

# Histological patterns showed that the most common finding was Minimal Change Disease (MCD), observed in 37.7% (20 out of 53) of the patients, followed by Focal Segmental Glomerulosclerosis (FSGS) in 35.8% (19 out of 53). Membranous Nephropathy (MN) and Membranoproliferative Glomerulonephritis (MPGN) were found in 9.4% (5 out of 53) each, while Focal Lupus Nephritis appeared in 5.7% (3 out of 53) of the cases, and IgA Nephropathy was observed in 1.9% (1 out of 53).

# Regarding the sub-patterns of kidney disease, 37.7% (20 out of 53) had MCD, and 32.1% (17 out of 53) had FSGS (NOS). FSGS (TIP), Lupus I, and Lupus III were less common, each found in small proportions of the sample (3.8% or less). MPGN and MN each represented 9.4%, while IgA Nephropathy was observed in 1.9%.

# The majority of kidney diseases were primary in nature, accounting for 92.5% (49 out of 53) of the cases, while 7.5% (4 out of 53) had secondary kidney disease. The sub-causes of secondary kidney disease included Lupus in 5.7% (3 out of 53) and Hepatitis B in 1.9% (1 out of 53).

# This table highlights that most individuals had primary kidney disease, with MCD and FSGS being the most prevalent histological patterns. A smaller percentage of patients had secondary causes, such as Lupus and Hepatitis B. The findings on kidney size, echogenicity, and corticomedullary differentiation suggest that kidney structure was generally normal for most of the participants.

# Table 5. Laboratory findings of Adult Patients with Nephrotic syndrome (NS) in Usmanu Danfodiyo University Teaching Hospital Sokoto, Nigeria (n = 53)

|  |  |  |
| --- | --- | --- |
| **Kidney Ultrasound and Histology Findings** | **Frequency (n=53)** | **Percent (%)** |
| **Both kidneys** |  |  |
| Yes | 53 | 100 |
| **Kidney sizes** |  |  |
| Normal | 52 | 98.1 |
| Enlarged | 1 | 1.9 |
| **Echogenicity** |  |  |
| Increased | 7 | 13.2 |
| Normal | 46 | 86.8 |
| **Corticomedullary \_ D** |  |  |
| Good | 47 | 88.7 |
| Poor | 6 | 11.3 |
| **Pattern** |  |  |
| MCD | 20 | 37.7 |
| FSGS | 19 | 35.8 |
| MN | 5 | 9.4 |
| MPGN | 5 | 9.4 |
| Focal lupus | 3 | 5.7 |
| IgA Nephropathy | 1 | 1.9 |
| **Sub\_pattern** |  |  |
| MCD | 20 | 37.7 |
| FSGS (NOS) | 17 | 32.1 |
| FSGS (TIP) | 2 | 3.8 |
| MN | 5 | 9.4 |
| LUPUS I | 1 | 1.9 |
| LUPUS III | 2 | 3.8 |
| MPGN | 5 | 9.4 |
| IgA Nephropathy | 1 | 1.9 |
| **Cause** |  |  |
| Primary | 49 | 92.5 |
| Secondary | 4 | 7.5 |
| **Sub\_cause** |  |  |
| Primary | 49 | 92.5 |
| LUPUS | 3 | 5.7 |
| HEPATITIS B | 1 | 1.9 |

The table titled "Sociodemographic Factors Associated with Histological Pattern Among Adult Patients with Nephrotic Syndrome in Usmanu Danfodiyo University Teaching Hospital Sokoto, Nigeria (n = 53)" presents data on the distribution of different histological patterns of nephrotic syndrome across various sociodemographic variables. The age categories of patients with nephrotic syndrome were divided into four groups: <20, 20-29, 30-39, and ≥40 years. The histological patterns, including MCD (Minimal Change Disease), FSGS (Focal Segmental Glomerulosclerosis), MN (Membranous Nephropathy), MPGN (Membranoproliferative Glomerulonephritis), Focal Lupus, and IgA Nephropathy, were then distributed across these age categories. The p-value of 0.855 indicates that age does not have a statistically significant association with histological patterns of nephrotic syndrome. This suggests that age does not play a major role in determining the histological pattern.

Regarding gender, the table shows that males had higher percentages of MCD and FSGS, while females had higher percentages of MPGN and Focal Lupus. The p-value of 0.026 indicates that gender is statistically significant, suggesting that gender differences may influence the histological patterns of nephrotic syndrome.

For education status, the table compares patients with formal and no formal education. The data shows that MCD was more common in patients with formal education, while FSGS was more frequent in those without formal education. However, the p-value of 0.160 indicates that education status does not significantly affect the histological pattern of nephrotic syndrome.

The table also presents data based on the state of residence, including Sokoto, Kebbi, Zamfara, and Niger states. It shows that FSGS was more prevalent among patients from Sokoto, while MCD was more common in patients from Kebbi. The p-value of 0.009 indicates a significant association between the state of residence and histological pattern, suggesting that geographic factors may influence the distribution of nephrotic syndrome histology.

# Sociodemographic Factors Associated with Histological pattern Among Adult Patients with Nephrotic syndrome in Usmanu Danfodiyo University Teaching Hospital Sokoto, Nigeria (n = 53).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **MCD**  **n (%)** | **FSGS**  **n (%)** | **MN**  **n (%)** | **MPGN**  **n (%)** | **Focal LUPS**  **n (%)** | **IgA Nephropathy**  **n (%)** | **Test of significance** |
| **Age categories** (years)  <20  20- 29  30-39  ≥40 | 4(40.0)  11(39.3)  4(33.3)  1((33.3) | 4(40.0)  10(35.7)  3(25)  2(66.7) | 0(0.0)  4(14.3)  1(8.3)  0(0.0) | 1(10.0)  1(3.6)  3(25)  0(0.0) | 1(10.0)  1(3.6)  1(8.3)  0(0.0) | 0(0.0)  1(0.0)  0(0.0)  0(0.0) | FE χ2- 11.107  *p*=0.855 |
| **Gender**  Male  Female | 14(37.8)  6(37.5) | 15(13.5)  4(25) | 5(13.5)  0(0.0) | 2(5.4)  3(18.8) | 0(0.0)  3(18.8) | 1(2.7)  0(0.0) | FE χ2- 10.705  *p*=0.026 |
| **Education status**  Formal education  No formal education | 12(35.3)  8(42.1) | 9(26.5)  10(52.6) | 5(14.7)  0(0.0) | 4(11.8)  1(5.3) | 3(8.8)  0(.0) | 1(2.9)  0(0.0) | FE χ2- 7.119  *p*=0.160 |
| **State of residence**  Sokoto  Kebbi  Zamfara  Niger | 11(33.3)  9(64.3)  0(0.0)  0(0.0) | 14(42.4)  2(14.3)  2(66.7)  1(33.3) | 5(15.2)  0(0.0)  0(0.0)  0(0.0) | 1(3.0)  3(21.4)  0(0.0)  1(33.3) | 1(3.0)  0(0.0)  1(33.3)  1(33.3) | 1(3.0)  0(0.0)  0(0.0)  0(0.0) | FE χ2- 25.153  *p*= 0.009 |

This table presents the clinical history associated with histological patterns in adult patients with nephrotic syndrome at Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria. The data reflect the frequency and percentage of specific clinical symptoms observed across different nephrotic syndrome histological patterns, including MCD, FSGS, MN, MPGN, Focal lupus, and IgA nephropathy. The significance of the associations between these clinical histories and histological patterns was tested using Fisher's Exact Test (FE χ²), with the corresponding p-values provided.

Foamy urine was most commonly observed in the MCD and FSGS groups, with frequencies of 38.0% and 34.0%, respectively. It was less common in the MN, MPGN, and Focal lupus groups. The Fisher’s Exact Test (FE χ² = 3.021) yielded a p-value of 0.846, indicating no statistically significant relationship between foamy urine and histological patterns.

Decline in urine output was reported in varying frequencies across the histological groups. It was most common in the FSGS group (38.5%) and less frequent in the other groups. The p-value of 0.078 (FE χ² = 8.636) suggests a trend toward statistical significance but is not significant at the 5% level, indicating that this clinical feature does not strongly differentiate between histological patterns.

Allergies were most frequently observed in the MCD group (80.0%), but the other groups showed much lower frequencies of allergies, with FSGS and IgA nephropathy showing no cases. The Fisher’s Exact Test (FE χ² = 6.372) yielded a p-value of 0.261, which indicates no statistically significant association between allergies and histological patterns in nephrotic syndrome.

NSAID use was most prevalent in the MCD group (47.6%) and least frequent in the IgA nephropathy group (0.0%). Other groups, including FSGS and MN, had intermediate levels of NSAID use. The statistical analysis showed a significant association between NSAID use and the histological pattern, with a p-value of 0.021 (FE χ² = 11.244), suggesting that NSAID use may be particularly common in MCD.

Hair loss was observed at a high frequency in the Focal lupus group (75.0%), with lower frequencies in the other groups. The Fisher’s Exact Test (FE χ² = 17.019) yielded a p-value of 0.001, indicating a statistically significant association between hair loss and the Focal lupus pattern of nephrotic syndrome. This suggests that hair loss is a prominent clinical feature in patients with Focal lupus nephritis.

Body rashes were similarly associated with the Focal lupus group, where 75.0% of patients reported rashes. Other groups, including MCD and FSGS, had much lower frequencies of body rashes. The Fisher’s Exact Test (FE χ² = 17.019) resulted in a p-value of 0.001, indicating that body rashes are significantly associated with Focal lupus nephritis.

**Clinical history associated with histological pattern Among Adult Patients with Nephrotic syndrome in Usmanu Danfodiyo University Teaching Hospital Sokoto, Nigeria (n = 53)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **MCD**  **n (%)** | **FSGS**  **n (%)** | **MN**  **n (%)** | **MPGN**  **n (%)** | **Focal LUPS**  **n (%)** | **IgA Nephropathy**  **n (%)** | **Test of significance** |
| Foamy urine  Yes  No | 19(38.0)  1(33.3) | 17(34.0)  2(66.7) | 5(10.0)  0(0.0) | 5(10.0)  0(0.0) | 3(6.0)  0(0.0) | 1(2.0)  0(0.0) | FE χ2- 3.021  *p*= 0.846 |
| Decline in urine output  Yes  No | 2(15.4)  18(45.0) | 5(38.5)  14(35.0) | 1(7.7)  4(10.0) | 3(23.1)  2(5.0) | 1(7.7)  2(5.0) | 1(7.7)  0(0.0) | FE χ2- 8.636  *p*= 0.078 |
| Allergies  Yes  No | 4(80.0)  16(33.3) | 0(0.0)  19(39.9) | 1(20.0)  4(8.3) | 0(0.0)  5(10.4) | 0(0.0)  3(6.2) | 0(0.0)  1(2.1) | FE χ2- 6.372  *p*= 0.261 |
| NSAIDS use  Yes  No | 10(47.6)  10(31.2) | 3(14.3)  16(50.0) | 3(14.3)  2(6.2) | 2(9.5)  3(9.4) | 3(14.3)  0(0.0) | 0(0.0)  1(3.1) | FE χ2- 11.244  *p*= 0.021 |
| Hair loss  Yes  No | 1(25.0)  19(38.8) | 0(0.0)  19(38.8) | 0(0.0)  5(10.2) | 0(0.0)  5(10.2) | 3(75.0)  0(0.0) | 0(0.0)  1(2.0) | FE χ2- 17.019  *p*= 0.001 |
| Body rashes  Yes  No | 1(25.0)  19(38.8) | 0(0.0)  19(38.8) | 0(0.0)  19(10.2) | 0(0.0)  5(10.2) | 3(75.0)  0(0.0) | 0(0.0)  1(2.0) | FE χ2- 17.019  *p*=0.001 |

This table provides data on the physical and systemic examination findings associated with different histological patterns of nephrotic syndrome in adult patients at Usmanu Danfodiyo University Teaching Hospital in Sokoto, Nigeria. It includes variables such as body swelling, leukonychia, xanthelasma, Muercke's line, and blood pressure at presentation and biopsy. The frequencies of these findings are reported across the histological groups of MCD, FSGS, MN, MPGN, Focal lupus, and IgA nephropathy. Fisher's Exact Test (FE χ²) was used to assess the statistical significance of the relationships between these clinical findings and histological patterns, with the corresponding p-values provided.

Body Swelling: The MCD and FSGS groups had the highest frequencies of body swelling, with 32.6% and 39.1% of patients, respectively, reporting this symptom. However, the frequency of body swelling was much lower in other histological groups. The p-value of 0.120 (FE χ² = 7.874) suggests no statistically significant association between body swelling and histological patterns, indicating that body swelling is not a distinguishing feature among the nephrotic syndrome subtypes in this cohort.

Leukonychia: The MCD group showed no cases of leukonychia, while the FSGS group had 100% of cases with leukonychia. Other groups had very few or no cases. The p-value of 0.623 (FE χ² = 6.522) indicates that leukonychia is not significantly associated with the histological patterns of nephrotic syndrome in this sample, implying that the presence of leukonychia does not help differentiate the subtypes.

Xanthelasma: This feature was most commonly observed in the MCD group (57.1%) and the FSGS group (28.6%). Other groups, including MN, MPGN, Focal lupus, and IgA nephropathy, had much lower frequencies of xanthelasma. The p-value of 0.594 (FE χ² = 3.608) indicates no statistically significant association between xanthelasma and histological pattern, suggesting that this clinical feature is not a strong differentiator between the nephrotic syndrome subtypes.

Muercke's Line: This feature was observed in 50% of MN and MPGN patients but not in other groups. The p-value of 0.094 (FE χ² = 9.120) is close to the threshold for statistical significance (p < 0.05), suggesting a possible relationship, though it does not reach significance at the conventional level. The presence of Muercke’s line might have a marginal association with certain histological patterns, particularly MN and MPGN.

Blood Pressure at Presentation: The highest proportion of patients with high blood pressure at presentation was seen in the MCD and FSGS groups (38.1% for both). The frequencies in other groups were generally lower. The p-value of 0.086 (FE χ² = 8.333) indicates no statistically significant association between high blood pressure at presentation and histological pattern, although the result is close to significance, suggesting a potential trend.

Blood Pressure at Biopsy: The FSGS group had the highest frequency of high blood pressure at biopsy (36.5%), followed by MCD (38.5%). Other groups, including MN, MPGN, and Focal lupus, had fewer instances of high blood pressure at biopsy. The p-value of 0.019 (FE χ² = 12.411) indicates a statistically significant association between high blood pressure at biopsy and histological pattern, suggesting that blood pressure at biopsy may be a useful factor in distinguishing between nephrotic syndrome subtypes, particularly for MCD and FSGS.

**Physical and Systemic Examination Findings associated with histological pattern Among Adult Patients with Nephrotic syndrome in Usmanu Danfodiyo University Teaching Hospital Sokoto, Nigeria (n = 53)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **MCD**  **n (%)** | **FSGS**  **n (%)** | **MN**  **n (%)** | **MPGN**  **n (%)** | **Focal LUPS**  **n (%)** | **IgA Nephropathy**  **n (%)** | **Test of significance** |
| Body swelling  Yes  No | 15(32.6)  5(71.4) | 18(39.1)  1(14.3) | 5(10.9)  0(0.0) | 5(10.9)  0(0.0) | 3(6.5)  0(0.0) | 0(0.0)  1(14.3) | FE χ2- 7.874  *p*= 0.120 |
| Leukonychia  Yes  No | 0(0.0)  20(38.8) | 1(100)  18(34.6) | 0(0.0)  5(9.6) | 0(0.0)  5(9.6) | 0(0.0)  3(5.8) | 0(0.0)  1(1.9) | FE χ2- 6.522  *p*= 0.623 |
| Xanthelasma  Yes  No | 4(57.1)  16(34.8) | 2(28.6)  17(37.0) | 0(0.0)  5(10.9) | 0(0.0)  5(10.0) | 1(14.3)  2(4.3) | 0(0.0)  1(2.2) | FE χ2- 3.608  *p*= 0.594 |
| Muercke’line  Yes  No | 0(0.0)  20(79.2) | 0(0.0)  19(37.3) | 1(50.0)  4(7.8) | 1(50.0)  4(7.8) | 0(0.0)  3(5.9) | 0(0.0)  1(2.0) | FE χ2- 9.120  *p*= 0.094 |
| BP at presentation  High  Normal | 16(38.1)  4(36.4) | 16(38.1)  3(27.3) | 5(11.9)  0(0.0) | 2(4.8)  3(27.3) | 3(7.1)  0(0.0) | 0(0.0)  1(9.1) | FE χ2- 8.333  *p*= 0.086 |
| BP at biopsy  High  Normal | 20(38.5)  0(0.0) | 19(36.5)  0(0.0) | 5(9.6)  0(0.0) | 5(9.6)  0(0.0) | 3(5.8)  0(0.0) | 0(0.0)  1(100) | FE χ2- 12.411  *p*= 0.019 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IgA** | **IgM** | **IgG** | **C3** | **Pattern** | **Sub pattern** | **Cause** |
| neg | neg | pos | Neg | MN | MN | Primary |
| neg | neg | neg | Neg | FSGS | FSGS (NOS) | Primary |
| neg | neg | pos | Pos | MN | MN | Primary |
| neg | neg | neg | Neg | FSGS | FSGS (NOS | Primary |
| neg | neg | neg | Neg | MCD | MCD | Primary |
| neg | neg | neg | Neg | FSGS | FSGS (NOS) | Primary |
| neg | neg | neg | Neg | MCD | MCD | Primary |
| neg | neg | neg | Neg | FSGS | FSGS (NOS) | Primary |
| neg | neg | neg | Neg | FSGS | FSGS (NOS) | Primary |
| neg | neg | neg | Neg | FSGS | FSGS (NOS) | Primary |
| pos | pos | neg | pos | IgA N | IgA N | Primary |
| neg | neg | neg | neg | FSGS | FSGS (NOS) | Primary |
| neg | neg | neg | neg | MCD | MCD | Primary |
| pos | pos | neg | neg | FSGS | FSGS (NOS) | Primary |
| neg | neg | pos | pos | MN | MN | Primary |
| neg | neg | neg | neg | MCD | MCD | Primary |
| neg | neg | neg | neg | FSGS | FSGS (TIP) | Primary |
| neg | neg | neg | neg | MCD | MCD | Primary |
| neg | neg | neg | neg | MCD | MCD | Primary |
| neg | neg | neg | neg | FSGS | FSGS (NOS) | Primary |
| neg | neg | neg | neg | MCD | MCD | Primary |
| neg | neg | neg | neg | FSGS | FSGS (NOS) | Primary |
| neg | pos | neg | neg | MCD | MCD | Primary |
| neg | neg | pos | pos | MPGN | MPGN | Primary |
| neg | neg | neg | neg | MPGN | MPGN | Primary |
| neg | neg | neg | neg | FSGS | FSGS (NOS) | Primary |
| neg | neg | neg | neg | MCD | MCD | Primary |
| neg | neg | pos | neg | MCD | MCD | Primary |
| neg | neg | neg | neg | MCD | MCD | Primary |
| neg | pos | neg | neg | FSGS | FSGS (NOS) | Primary |
| neg | neg | neg | neg | MCD | MCD | Primary |
| neg | neg | neg | neg | MCD | MCD | Primary |
| pos | pos | pos | pos | FOCAL LUPUS | LUPUS III | Secondary |
| pos | pos | neg | neg | MN | MN | Secondary |
| neg | pos | neg | neg | MCD | MCD | Primary |
| neg | neg | neg | neg | FSGS | FSGS (NOS) | Primary |
| pos | pos | pos | pos | FOCAL LUPUS | LUPUS III | Secondary |
| pos | pos | pos | neg | MCD | MCD | Primary |
| pos | pos | neg | neg | FSGS | FSGS (NOS) | Primary |
| neg | neg | pos | neg | MN | MN | Primary |
| neg | neg | pos | neg | FSGS | FSGS (NOS) | Primary |
| pos | pos | pos | pos | FOCAL LUPUS | LUPUS III | Secondary |
| neg | pos | pos | neg | MCD | MCD | Primary |
| neg | neg | neg | neg | FSGS | FSGS (NOS) | Primary |
| neg | neg | neg | neg | MPGN | MPGN | Primary |
| neg | neg | neg | neg | MCD | MCD | Primary |
| neg | neg | neg | neg | FSGS | FSGS (NOS) | Primary |
| neg | pos | neg | neg | MCD | MCD | Primary |
| neg | pos | neg | neg | FSGS | FSGS (NOS) | Primary |
| neg | neg | neg | neg | MPGN | MPGN | Primary |
| neg | neg | neg | neg | MCD | MCD | Primary |
| neg | pos | neg | neg | MCD | MCD | Primary |
| neg | neg | neg | pos | MPGN | MPGN | Primary |