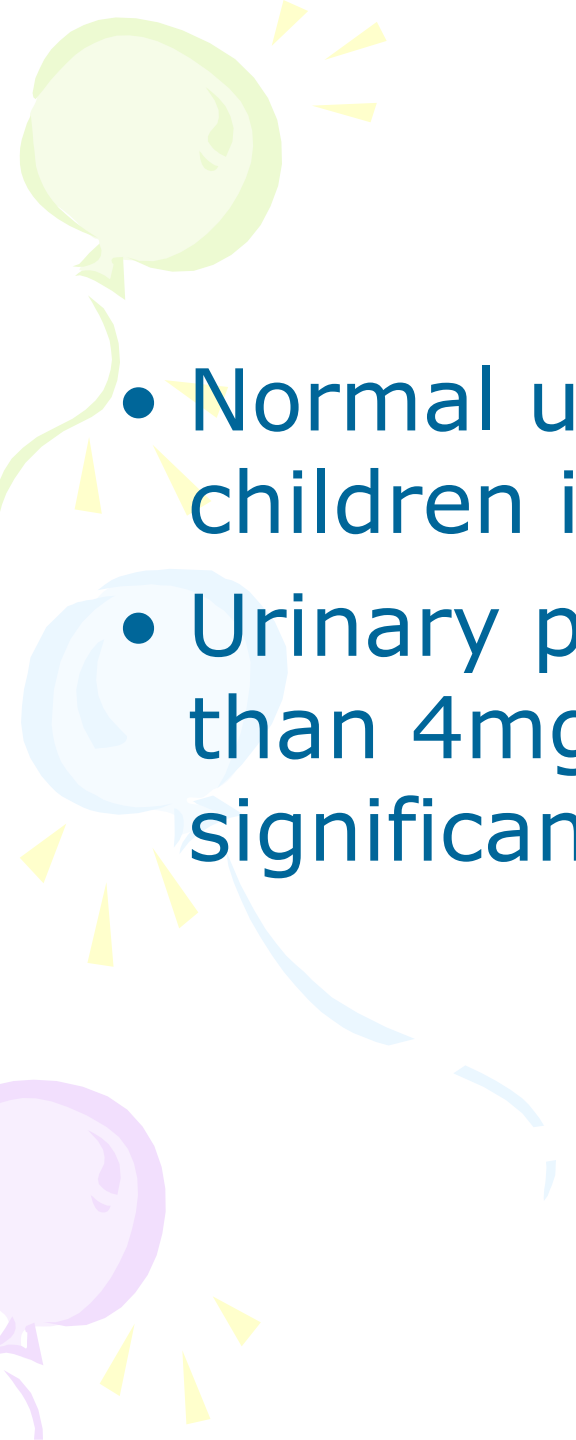


The background features several large, overlapping, colorful swirls in shades of purple, green, and light blue. Scattered throughout are numerous small, yellow, triangular shapes that resemble sun rays or confetti. The overall aesthetic is bright and modern.

# **Approach to proteinuria**

**By  
Dr. Waqas**

- 
- Normal urinary protein excretion in children is upto  $4\text{mg}/\text{m}^2/\text{hr}$
  - Urinary protein excretion of more than  $4\text{mg}/\text{m}^2/\text{hr}$  is considered as significant proteinuria.

# Normal Urinary Protein Excretion in Infants and Children

<b>Age group</b>	<b>Total protein (mg/24 hrs)</b>	<b>Total protein (mg/m<sup>2</sup>/24hrs)</b>
5 to 30 days (premature)	29	182
7 to 30 days (full term)	32	145
2 to 12 months (infant)	38	109
2 to 4 years (child)	49	91
4 to 10 years	71	85
10 to 16 years	83	63



# Mechanism of proteinuria

- Glomerular capillary wall & its adjacent structures constitute main barrier to the passage of macromolecules.
- Glomerular capillary wall also contains negatively charged proteins which repel negatively charged macromolecules such as albumen.



# Mechanism of proteinuria

- Most inflammatory glomerular diseases result in alteration of size barrier & loss of anionic charges leading to proteinuria.
- Injury to tubular epithelium leads to inability of tubule to reabsorb freely filtered low molecular weight proteins & loss in urine.



# Mechanism of proteinuria

- Hemodynamic alterations in glomerular blood flow can also result in proteinuria
- reduced number of functioning nephrons, as occurs in chronic renal failure, leads to increased filtration of proteins in the remaining nephrons and to proteinuria.
- Other conditions that cause proteinuria include exercise, fever, seizures, epinephrine use and emotional stress

# Measurement of proteinuria

- Dipstick method

Proteins in solution cause change in color of reagent Tetrabromophenol blue

Amount of protein in urine is assessed as:

Nil (<10mg/dl)

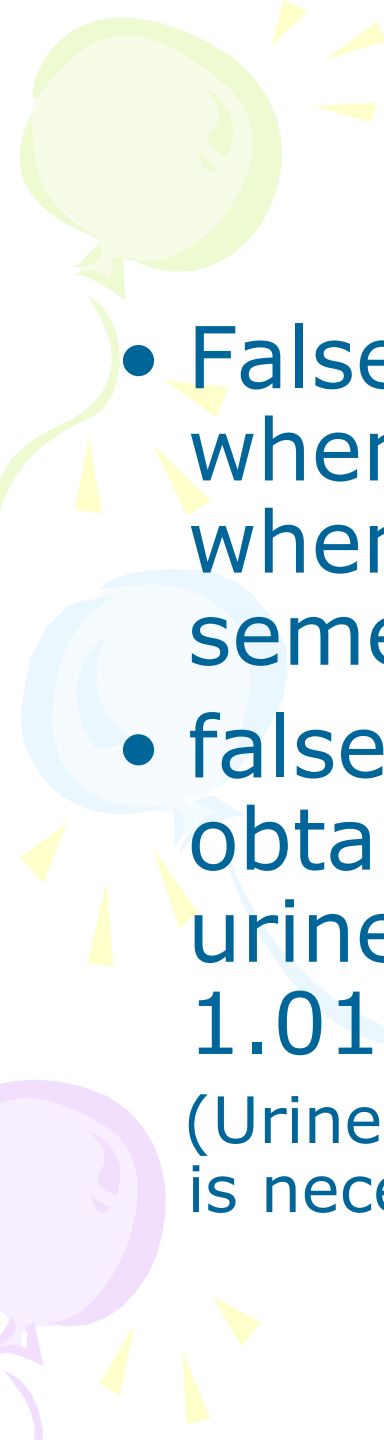
Trace (10—20mg/dl)

1+ (30mg/dl)

2+ (100mg/dl)

3+ (300mg/dl)

4+ (1000-2000mg/dl)

- 
- False positive results can be obtained when urine is alkaline ( $\text{pH} > 7$ ) or when it contains heavy mucus, pus, semen or vaginal secretions
  - false-negative results can be obtained in the presence of a dilute urine (i.e., specific gravity less than 1.010).

(Urine with a specific gravity greater than 1.015 is necessary for reliable results)





# Etiologic Classification of Proteinuria in Children

- **Transient proteinuria**
- **Isolated asymptomatic proteinuria**
  - Orthostatic proteinuria
  - Persistent fixed proteinuria



# Etiologic Classification of Proteinuria in Children

- **Proteinuria secondary to renal diseases**

Minimal change nephrotic syndrome

Acute postinfectious glomerulonephritis

Focal segmental glomerulonephritis

Membranous nephropathy

Membranoproliferative glomerulonephritis

Lupus glomerulonephritis

Henoch-Schönlein purpura nephritis

HIV-associated nephropathy



# Etiologic Classification of Proteinuria in Children

- **Tubular diseases**

cystinosis

wilson disease

galactosemia

tubulointerstitial nephritis

acute tubular necrosis

heavy metal poisoning



# Etiologic Classification of Proteinuria in Children

- **Congenital and acquired urinary tract abnormalities**

Hydronephrosis

Polycystic kidney disease

Reflux nephropathy

Renal dysplasia

# Evaluation of proteinuria

Urine sample positive for protein

Repeat twice

Only first urine sample is positive for proteins

**Transient Proteinuria**  
(routine follow up)

Two or more urine samples are positive for proteins

s.electrolytes, s.urea,  
s.creatinine, s.albumen,  
CBC, urinary protein  
creatinine ratio, C3



- **Transient proteinuria**

Fever

Strenuous exercise

cold exposure

Epinephrine administration

Emotional stress

Congestive heart failure

Abdominal surgery

Seizures

- Proteinuria resolve spontaneously after cessation of causal factor & extensive workup is usually not recommended

**Two or more urine samples are positive for proteins**

**s.urea, s.creatinine, s.albumen, CBC,  
urinary protein creatinine ratio, C3**

**Normal lab. results**

**Collect first voided urine  
sample immediately upon  
arising in the morning for  
3 cosecutive days**

**No proteinuria**

**Orthostatic Proteinuria  
(annual follow up)**

**abnormal lab.  
results**



# Orthostatic (Postural) Proteinuria

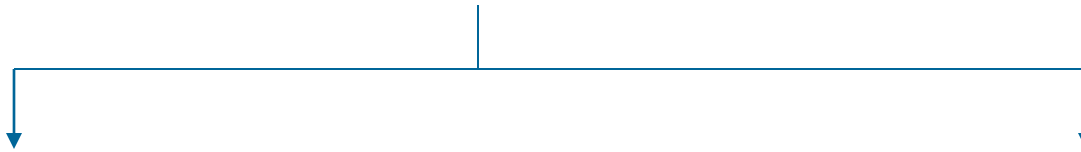
- accounts for up to 60 percent of all cases of asymptomatic proteinuria
- children with orthostatic proteinuria excrete less than 1 g of protein in 24 hours (UPr/Cr less than 1.0).
- prognosis with orthostatic proteinuria is excellent
- Yearly follow-up is recommended for children diagnosed with this condition.



**Two or more urine samples are positive for proteins**



**s.urea, s.creatinine, s.albumen, CBC,  
urinary protein creatinine ratio, C3**



**s.Creatinine- high/normal  
U.Pr:Cr  $\leq 1.0$   
H/O UTI & polyuria**



**Tubulo-interstitial  
disease**

**urinary protein creatinine ratio  $> 2.0$   
Urinary protein excretion  $> 40 \text{mg/m}^2/\text{hr}$   
S.Albumen – decreased  
s.Cholestrol - increased**



**Nephrotic syndrome  
(corticosteroid therapy)**

# Nephrotic syndrome

- Minimal change nephrotic syndrome
- Focal segmental glomerulonephritis
- Mesangial proliferation

- **Diagnosis**

**Proteinuria 3+ or 4+**

**urinary protein creatinine ratio > 2.0**

**S.Albumen – decreased, s.Cholestrol – increased**

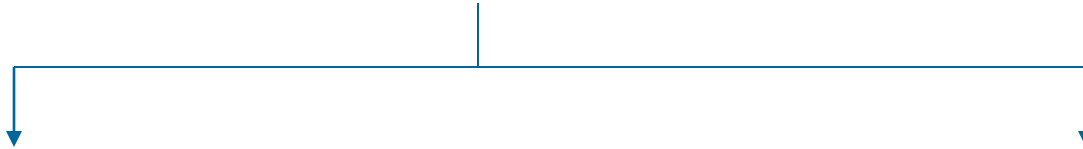
**Urinary protein excretion > 40mg/m<sup>2</sup>/hr**

**Total urine protein (g/m<sup>2</sup>/day) = 0.63 × (UPr/Cr)**

**Two or more urine samples are positive for proteins**



**s.urea, s.creatinine, s.albumen, CBC,  
urinary protein creatinine ratio, C3**



**Gross hematuria  
C3 level- low  
U.Pr:Cr  $\leq 1.0$   
Increased ASO titre  
s.Creatinine- high/normal**

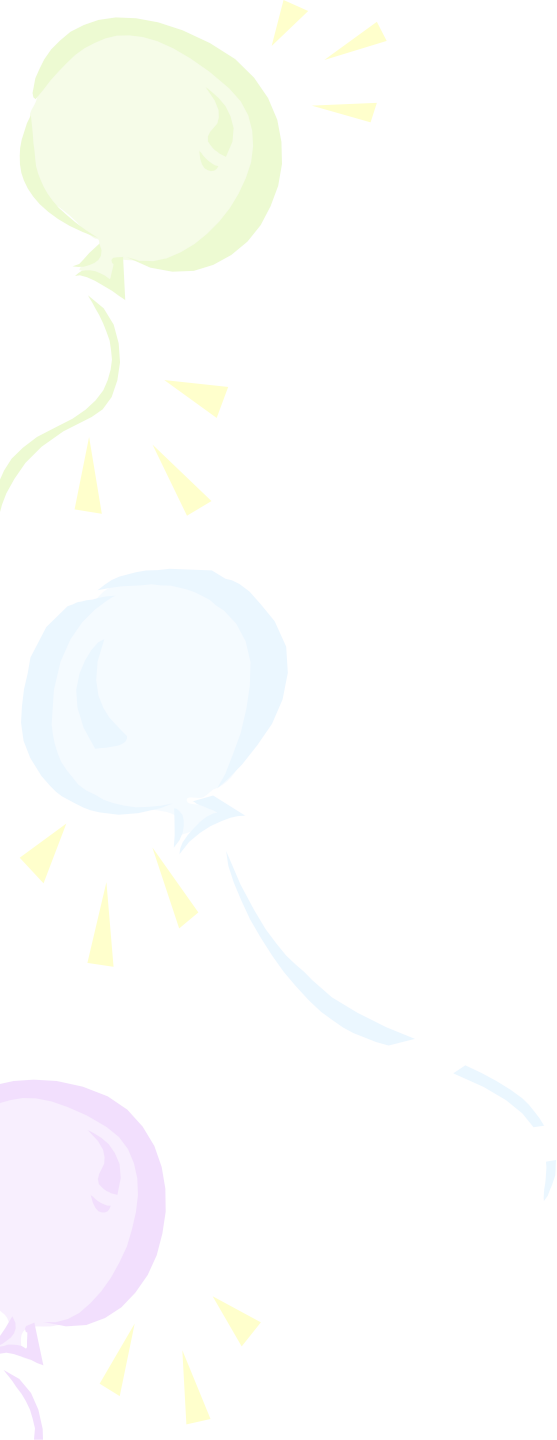


**Acute glomerulonephritis**

**Purpuric rash on thigh/buttocks  
Variable hematuria & proteinuria  
Albumen- normal/low**



**HSP nephritis**



**Thank You**