

## ORIGINAL ARTICLE

**Proteinuria Selectivity Index in Adult Primary Glomerulonephritis**ME Hoque<sup>1</sup>, MR Alam<sup>2</sup>, S Islam<sup>3</sup>, A Khanam<sup>4</sup>, H Rahman<sup>5</sup>, HU Rashid<sup>6</sup>.**Abstract:**

*In order to determine proteinuria selectivity index in adult, 50 patients of different types of primary glomerulonephritis were studied [mesangial proliferative glomerulonephritis (Mes. PGN) - 10, membranous nephropathy (MN) - 10, focal segmental glomerulosclerosis (FSGS) - 10, membranoproliferative glomerulonephritis (MPGN) - 10 and minimal change disease (MCD) - 10]. All the patients had normal renal function, were normotensive, and had nephrotic range proteinuria.*

*Selectivity index were calculated by measuring the ratio between the clearance of IgG with that of transferrin. It was found that 60% of MCD were highly selective and on the other hand no one of MPGN were highly selective. Highly selective cases were found in different numbers in other cases like 40% in mesangial proliferative type, 20% in membranous nephropathy and 10% in focal segmental glomerulosclerosis.*

*This study suggests that, in adult primary glomerulonephritides, highly selective cases are present mostly in minimal change disease (MCD).*

**Introduction:**

Proteinuria selectivity index was first described by Garry et al in 1964 in patients with nephrotic syndrome. Later, Cameron<sup>1</sup> simplified it and found the most accurate value by measuring the ratio between the clearance of IgG and clearance of transferrin. It can also be measured by ratio between the clearance of IgM and alpha-globulin, IgG and

heptoglobulin or ceruloplasmin. But the most corrected method was introduced by Cameron et al in 1966 and it is measured by the ratio between the clearance of IgG versus that of transferrin<sup>1</sup>. On the basis of selectivity index proteinuria can be classified as highly selective (SI<0.1), moderately selective (SI=0.11- 0.2) and nonselective (SI>0.2).

**Materials and method:**

Fifty patients, 30 male and 20 female, were purposely recruited for the study. All the patients had nephrotic range proteinuria. None of the patients received prednisolone or ACE-inhibitor previously. Renal biopsy and histopathological diagnosis were done by light microscopy and immunofluorescent study, and thereby confirmed the different types of primary glomerulonephritis. The cases were minimal change disease (MCD) - 10, mesangial proliferative glomerulonephritis (Mes. PGN) -

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10, focal segmental glomerulosclerosis (FSGS) - 10, membranous nephropathy (MN) -10 and membranoproliferative glomerulonephritis (MPGN) - 10.

After all aseptic precaution 5 ml of blood was drawn from antecubital vein of each patient, serum was separated, and serum albumin, transferrin and IgG were estimated by immunoturbidimetric method by using a RA-50 autoanalyser and turbex-plus protein analyser. Antisera were collected as anti-transferrin (goat) from Biochem immunosystem Italia -spa. About 10 -15 ml of urine was collected in a test tube at the same time. Before estimation of transferrin, twin - 20 (0.25%) solution was added to the urine sample during thawing. For urinary total protein, 24 hours urine was also collected with toluene. Urinary anti-transferrin antisera was collected from Dia-Iataron, Japan and anti-IgG antisera from Orion Diagnostica.

Proteinuria selectivity Index was calculated by using Cameron's formula in terms of the ratio between the clearance of IgG and clearance of transferrin.

### Results:

There were seven male and three female patients in MCD group, their mean age was  $22.4 \pm 3.8$  years. Mean ( $\pm$ SD) of serum albumin was  $15 (\pm 3.1)$  g/L, serum cholesterol  $283.20 (\pm 81)$  mg%, serum IgG  $1300 (\pm 390)$  mg%, urinary IgG  $90.40 (\pm 30)$  mg%, serum transferrin  $130 (\pm 60.40)$  mg%, urinary transferrin  $30.8 (\pm 10)$  mg% and urinary total protein  $6.20 (\pm 1.20)$  g/day. Six patients (60%) were highly selective, one (10%) moderately selective and three patients (30%) were nonselective (Table-I).

**Table-I :** Patient characteristics in different histological varieties of glomerular nephritis

Parameters	MCD (n=10)	Mes. Prolif. GN (n=10)	MN (n=10)	FSGS (n=10)	MPGN (n=10)
Age	$22.40 \pm 3.80$	$26 \pm 6.50$	$30.50 \pm 5.20$	$23.60 \pm 5.40$	$26.20 \pm 3.60$
Serum albumin	$15 \pm 3.10$	$20 \pm 3.30$	$19 \pm 3.90$	$13.50 \pm 1.58$	$20 \pm 3.60$
Serum cholesterol	$283.20 \pm 81$	$363.70 \pm 112$	$271 \pm 75.70$	$321.60 \pm 72.70$	$313.10 \pm 119.10$
Serum IgG	$1300 \pm 390$	$1280 \pm 520$	$1100 \pm 300$	$1250 \pm 490$	$1130 \pm 310$
Urinary IgG	$90.40 \pm 30$	$65 \pm 25$	$50 \pm 20.40$	$88.60 \pm 30.90$	$40.5 \pm 20.60$
Serum transferrin	$130 \pm 60.40$	$170 \pm 55$	$160 \pm 71$	$130 \pm 40.15$	$160 \pm 49$
Urinary transferrin	$30.80 \pm 10$	$166 \pm 45$	$31 \pm 11$	$37 \pm 10.60$	$31 \pm 14.50$
Urinary total protein	$6.20 \pm 1.20$	$5.80 \pm 2$	$7.50 \pm 2.10$	$8.20 \pm 2.50$	$6.50 \pm 2.50$

MCD=Minimal change disease

Mes. Prolif. GN= Mesangial proliferative GN

MN= Membranous nephropathy

FSGS = Focal segmental glomerulosclerosis

MPGN= Membranoproliferative GN

GN = Glomerulonephritis

Ten patients, seven male and three female, were in mesangial proliferative group. Mean age was 26 ( $\pm 6.50$ ) years. Mean serum albumin was 20 ( $\pm 3.30$ ) g/L, serum cholesterol  $363.70 (\pm 112)$  mg%, serum IgG  $1280 (\pm 520)$  mg%, urinary IgG  $65 (\pm 25)$  mg%, serum transferrin  $170 (\pm 55)$  mg%, urinary transferrin  $166 (\pm 45)$  mg%, and urinary total protein  $5.80 (\pm 2)$  g/day. Among them, 40% were highly selective, 30% moderately selective and 30% were nonselective (Table-I).

Among the patients included in membranous group, six were male and four female. Mean ( $\pm$ SD) age was  $32.50 (\pm 5.20)$  years. Mean ( $\pm$ SD) of serum albumin was  $19 (\pm 3.90)$  g/L, serum IgG  $1100 (\pm 300)$  mg%, urinary IgG  $50 (\pm 20.40)$ , serum transferrin  $160 (\pm 71)$  mg%, urinary transferrin  $31 (\pm 11)$  mg% and urinary total protein  $7.50 (\pm 2.10)$  g/day (Table - I).

Two patients (20%) were highly selective, two (20%) moderately selective and six (60%) were nonselective (Table-I).

Ten patients of FSGS were included in this study group, five male and five female. Mean ( $\pm$ SD) age of the patients was 23.60 ( $\pm$ 5.40) years. Mean  $\pm$ SD serum albumin was 13.50 ( $\pm$ 2.58) g/L, serum cholesterol 321.60 ( $\pm$ 72.70) mg/dl, serum IgG 1250 ( $\pm$ 490) mg/dl, urinary IgG 88.60 ( $\pm$ 30.90) mg/dl, serum transferrin 160 ( $\pm$ 71) mg/dl, urinary transferrin 37 ( $\pm$ 10.60) mg/dl and urinary total protein was 8.20 ( $\pm$ 2.50) g/day. One (10%) patient was highly selective, two (20%) patients were moderately selective and seven (70%) patients were non-selective (Table-I).

**Table-II:** Selectivity index in each histological group

GN	Highly Selective (SI<0.1)	Mod.Selective (SI=0.11-.2)	Non Selective (SI>0.2)	Total
MCD	06 (60%)	01 (10%)	02 (20%)	10
Mes.Prol.GN	04 (40%)	03 (30%)	03 (30%)	10
MN	02 (20%)	02 (20%)	06 (60%)	10
FSGS	01 (10)	02 (20%)	07 (70%)	10
MPGN	00 (00%)	03 (30%)	07 (70%)	10

MCD= Minimal change disease

Mes.Prol.GN= Mesangial proliferative GN

MN= Membranous nephropathy

FSGS = Focal segmental glomerulosclerosis

MPGN= Membranoproliferative GN

GN = Glomerulonephritis

SI = Selectivity index

Ten patients of MPGN were included in this study, six female and four male. Mean age of the patients was 26.20 ( $\pm$ 5.40) years. Urinary total protein was 6.50 ( $\pm$ 2.50) g/d, serum albumin 20 ( $\pm$ 3.60) g/l and serum cholesterol 313 ( $\pm$ 119) mg/dl. There was no highly selective in this group, three (30%) were moderately selective and seven (70%) were nonselective.

## Discussion:

This study was carried out to know the selectivity index in adult primary glomerulonephritis patients. Selectivity index was first measured by the ratio of clearance of IgG with that of transferrin and it was done by immunodiffusion method<sup>1</sup>. In this study it was done by immunoturbidimetric method<sup>2</sup>. As the index is based on comparative clearance, total urinary output has no influence and the risk of error from urine collection is eliminated.

In this study, among the histological varieties, highly selective cases were mostly found in MCD, which was similar to what was found by Laurent et al<sup>3</sup>. Next highly selective group cases were in those having mesangial proliferative glomerulonephritides. Membranous nephropathy group had 20% case having highly selective and only 10% of FSGS was highly selective. No such case was found among patients having membranoproliferative glomerulonephritides.

The mechanism of highly selectivity depends on the molecular weight of the protein<sup>4</sup> i.e. the nephropathy in which high molecular weight protein passes with urine causing nonselective proteinuria and in case of highly selective proteinuria the passage of low molecular protein like albumin is predominant. In case of nonselective proteinuria, there is more severe damage in the interstitium<sup>5</sup>. Selectivity index can give a guide about the severity of the histological lesion. Another study<sup>3</sup> showed that, by determining the proteinuria selectivity index, the nature of pathology e.g. crescentic glomerulonephritis can be predicted without undergoing renal biopsy.

In conclusion, it may be said that, in adults, highly selective proteinuria mostly occurs in

case of minimal change disease which is found in 90-95% cases in children. A high incidence is also found in mesangial proliferative glomerulonephritis. and high selectivity is absent in membranoproliferative type.

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