

*Research Article***Assessment of Serum urokinase Plasminogen Activator Receptor (SuPAR) Levels in Childhood Epilepsy****Magdy M. Kamel***, **Esmat El-Sharkawy****, **Samir M. Mounir***, and **Martina G. Shaker***

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Abstract:

Background: Epilepsy is the most common serious neurological disorder worldwide. Epilepsy is a chronic brain disorder affecting 3.5–5/1000 children in developed countries with 41–187/100,000 cases reported every year. It increases the incidence of complications and mortality. Generalized convulsive seizures (GCSs) are associated with high demands on the cardiovascular system, thereby facilitating cardiac complications. SuPAR is an emerging marker of cardiovascular disease burden. **Objectives: Aim of the study:** To assess suPAR levels in childhood epilepsy in pediatric department of neurology, El-Minia university children and maternity hospital. **Methods:** This was a case control study. Our children (6 to 60 months), who were divided into 2 groups; 30 children known epileptic and 30 children who were not epileptic and had no history of previous seizures or any illness that may induce convulsions or simulate epilepsy, served as control group matched in age and sex. Blood samples were collected and analyzed for suPAR levels. **The studied groups:** were subjected to careful detailed history taking, complete clinical examination, electroencephalography (EEG) and laboratory investigations including: suPAR, complete blood count (CBC), C-reactive protein (CRP) and renal function tests. **Results:** Plasma concentrations of suPAR were statistically insignificantly higher in epileptic children than the other group (P 0.300). There were statistically male predominance (56.7%) > female (43.3%) regarding the gender of the epileptic children. There was a weak negative not significant correlation between suPAR and the age of the child (r -0.093, p 0.396) and also, HB and suPAR (r -0.120, p 0.275). While there were weak positive not significant correlation between; TLC and SuPAR (r 0.152, p 0.164) and also, between platelet count and suPAR (r 0.073, p 0.504) . **Conclusion:** The higher level of SuPAR in small number of epileptic patients may be due to brain inflammation effect and /or early cardiac injury.

Keywords: biomarker, suPAR, epilepsy, seizures, cardiac stress.**Introduction**

Epilepsy is a chronic brain disorder affecting 3.5–5/1000 children in developed countries with 41–187/100,000 cases reported every year.⁽⁷⁾ Sudden unexpected death in epilepsy is a fatal complication. Potential mechanisms include cardiac arrhythmia, postictal cardiomyopathy, depressed autonomic function, and seizure-related respiratory failure.⁽¹⁶⁾ SuPAR is a novel biomarker that correlates significantly with cardiovascular events.⁽⁵⁾ SuPAR was the only novel cardiac biomarker without significant changes in the postictal period. Therefore, it might be a useful biomarker to

distinguish between GCS-related cardiac stress and genuine cardiac pathology.⁽⁹⁾

Patients and methods

This is a case-control study. Many children were taken during their regular follow up in the pediatric neurology outpatient clinic and neurology internal department, El-Minia University Children and Maternity Hospital. Others were taken during their admission in the internal department of pediatric neurology of the same hospital.

Our children were ranging from 6 to 60 months. They were classified into; Group

(a): 30 epileptic children and group (b): 30 children who were not epileptic and had no history of previous seizures on any illness that may induce convulsions or simulate epilepsy, served as control group matched in age and sex.

Then included children were subjected to the following:

a. Careful history taking including:

Name, age, sex, residence, socioeconomic standard and family history of convulsions and which type.

b. Full clinical examination: including

1- Vital data: respiratory rate, heart rate, blood pressure, temperature.

2- Systemic ex: neurological, full chest, cardiac and abdominal examinations.

c. Laboratory investigation: CBC, renal function, CRP and suPAR.

d. EEG.

Regarding suPAR level, our results showed that there was statistically no significant increase in suPAR level in epileptic group

than the other group (P value 0.300) as in **table (1)**.

Our study results showed that there was no statistically significant difference between focal and generalized convulsions in epileptic children group regarding suPAR level (P value 0.423) as in **table (2)**.

Regarding the sex of the epileptic children, there was statistically male predominance (56.7%) > female (43.3%) as in **figure (1)**.

There were a weak negative correlation between; suPAR and the age of the child (r -0.093, p 0.396) as in **figure (2)** and also, between suPAR and hemoglobin (Hb) levels (r -0.120, p 0.275) as in **figure (3)**, and those correlations were not significant.

There were a weak positive correlation between; suPAR and total leucocytic count (TLC) (r 0.152, p 0.164) as in **figure (4)** and also, between suPAR and platelet count (PLT) (r 0.073, p 0.504) as in **figure (5)**.

Table (1): Comparison between study groups regarding suPAR:

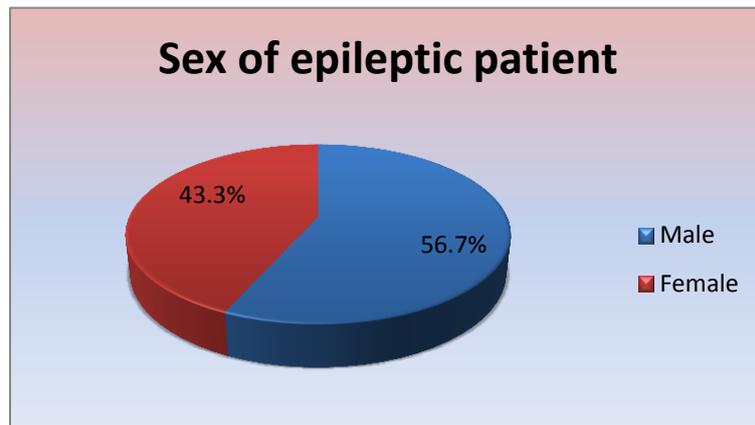
	Group (A) N = 30	Group (B) N = 30	P value
SuPAR			
Range	102 – 2153	110 – 1998	0.300
Mean ± SD	938 ± 766	779.8 ± 565.7	NS

P value calculated by Chi-square test (<0.05 is considered significant)

Table (2): Comparison between focal and generalized convulsions in epileptic children regarding suPAR:

Type of convulsions	Focal convulsions N = 10	Generalized convulsions N = 20	P value
SuPAR			
Range	103 – 2108	102 – 2153	0.423
Mean ± SD	776 ± 755.8	1019 ± 777.7	NS

Figure (1): Comparison between epileptic children regarding sex:



Comparison between epileptic children regarding sex shows statistically male predominance (56.7%) > female (43.3%).

Figure (2): Correlation between the age and suPAR:

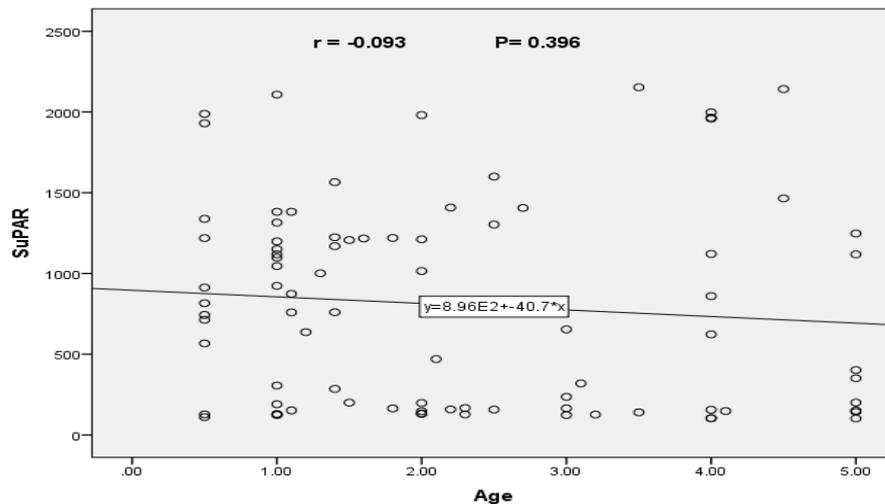


Figure (3): Correlation between Hb and suPAR:

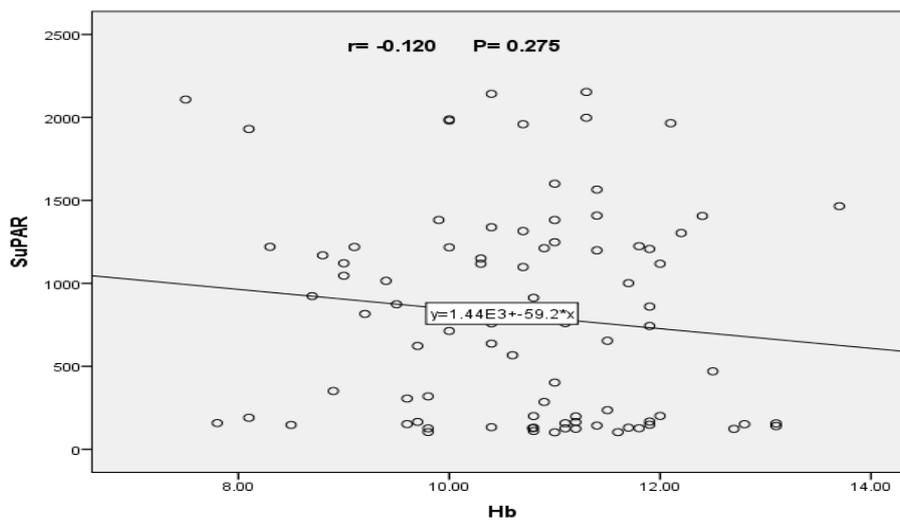


Figure (4): Correlation between TLC and suPAR:

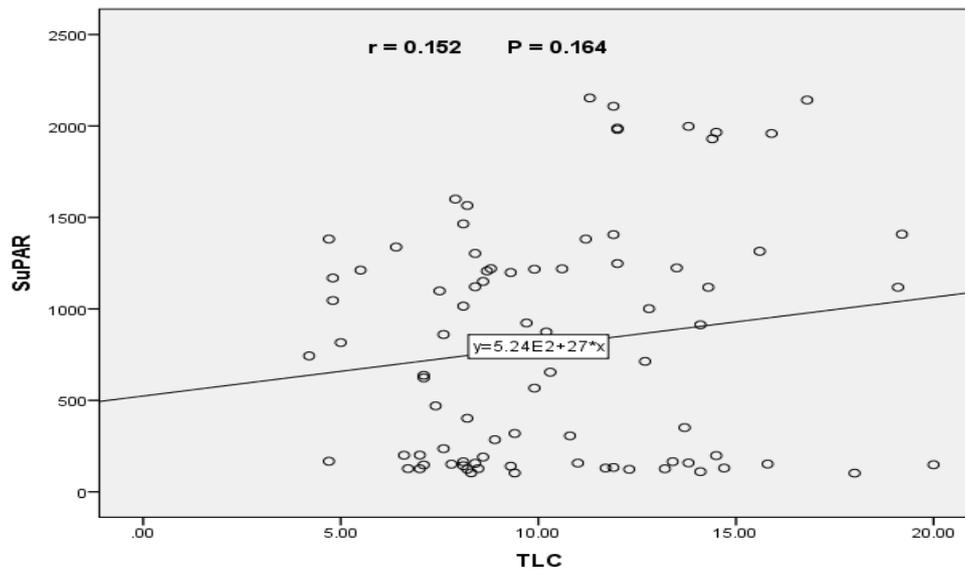
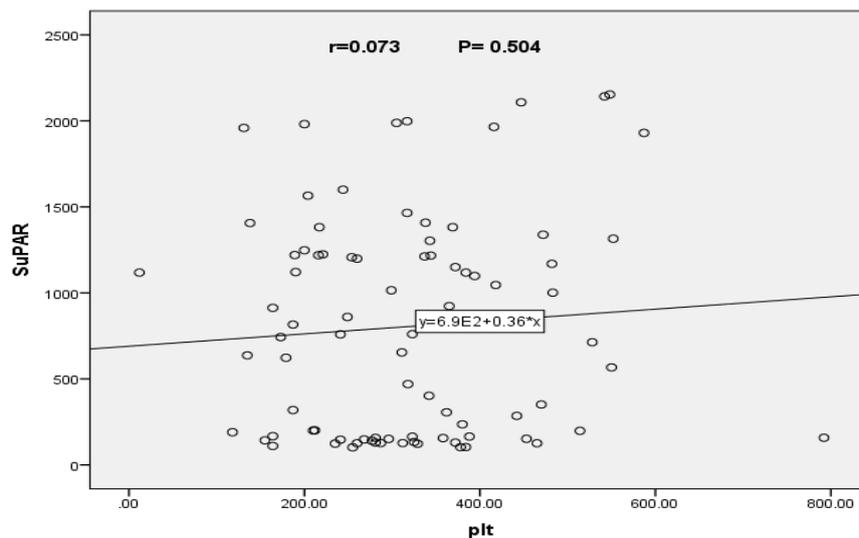


Figure (5): Correlation between PLT and suPAR:



The correlation coefficient: denoted symbolically r , defines the strength and direction of the linear relationship between two variables: **Grades of r :** 0.00 to 0.24 (weak or no **correlation**), 0.25 to 0.49 (fair **correlation**), 0.50 to 0.74 (moderate **correlation**), > 0.75 (strong **correlation**).

Discussion

Epilepsy is one of the most common neurological disorders with a worldwide prevalence between 5 and 10 per 1000 with considerable variations between different settings. In Egypt, the prevalence was 6.98/1000. ⁽¹⁴⁾ Patients with epilepsy have increased morbidity and mortality from ischemic heart disease and cerebrovascular

disease.⁽¹⁰⁾ SuPAR may indicate clinically relevant troponin elevations. It might be a useful biomarker to distinguish between seizure-related cardiac stress and cardiac ischemia.⁽⁹⁾

The major findings of our study is that; there is a higher suPAR level in small number of epileptic children and this was

statistically not significant in comparison to other study groups (P value 0.300) this was in agreement with^(2,9,19). In the contrary to our study was^(6,3). This can be described due to brain inflammation effect and / or early cardiac injury. The brain inflammation promotes increased neuronal excitability, decreases seizure threshold and is likely to be involved in the molecular, structural and synaptic changes characterizing epileptogenesis. Also, as suPAR is a novel cardiovascular marker, those patients may have early cardiac impairment but this needs further assessment and investigations.

Our study results showed that there was no statistically significant difference between focal and generalized convulsions in epileptic children group regarding suPAR level (P value 0.423). This was in agreement with⁽⁹⁾ and in disagreement with⁽⁶⁾.

In our study prevalence of epilepsy was higher in boys (56.7%) than girls (43.3%) that was in agreement with most reports of gender difference in epilepsy such as^(4,7). This difference was not attributed to the fact that boys outnumbered girls in our sample as we adjusted the ratio in relation to the total numbers of boys and girls separately. This is because the great attention given to males more than females in their families as a concept in the Upper Egypt.

The study showed that there was a weak negative correlation between suPAR and the age (r -0.093, p 0.396) and this correlation is not significant. This was in agreement with⁽⁴⁾. But, in disagreement with our study results was^(3,8), both stated that there was a significant increase in suPAR with age was observed.

In our study there is a weak negative correlation between HB and SuPAR this correlation is not significant (r -0.120, p 0.275) this is in agreement with⁽¹²⁾ that stated that normal erythrocytes lack expression of uPAR. In contrary to our study was⁽¹⁸⁾.

In our study there was a weak positive correlation (r 0.152, p 0.164) between TLC and suPAR and this correlation was not

significant. Also, there was a weak positive correlation (r 0.073, p 0.504) between platelet and suPAR this correlation was not significant. This was in agreement with^{(11), (15)} that stated that a high neutrophil count could contribute directly to a high plasma concentration of suPAR. Also, suPAR concentrations were highest in patients who later develop thrombosis

Conclusion

As suPAR showed non-significant elevation in epileptic children than others, it may be due to brain inflammatory effect and / or early cardiac injury. Also, suPAR might be a useful biomarker to distinguish between seizure-related cardiac stress and cardiac ischemia.

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