Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 14s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Metabolic Syndrome in Epileptic Children on Sodium Valproate Therapy- A Cross-Sectional Observational Study

Dr Gautam Guha[1], Dr Suparna Guha[2], Dr Papai Khetrapal[3]

[1]Associate Professor, Department of Neuromedicine, Burdwan Medical college west Bengal

[2]Professor, Department of Paediatrics Medicine, VIMS & RKMSP

[3]Specialist Medical Officer, Uttarpara State General Hospital

***Corresponding Author**

Dr Gautam Guha

Cite this paper as: Dr Gautam Guha, Dr Suparna Guha, Dr Papai Khetrapal, (2025) Metabolic Syndrome in Epileptic Children on Sodium Valproate Therapy- A Cross-Sectional Observational Study. *Journal of Neonatal Surgery*, 14 (14s), 395-400.

ABSTRACT

Background

Epilepsy is a common neurological disorder affecting children worldwide, with sodium valproate (VPA) being a widely used antiepileptic drug. However, long-term VPA therapy is associated with metabolic complications, including weight gain, dyslipidemia, and increased risk of metabolic syndrome. This study aims to evaluate the impact of VPA on metabolic parameters in pediatric epileptic patients.

Methods

A cross-sectional study was conducted at the Vivekananda Institute of Medical Sciences, Kolkata, involving 50 pediatric epileptic patients on VPA monotherapy for over a year and 50 age- and sex-matched healthy controls. Anthropometric measurements, including BMI and waist circumference, were recorded. Blood samples were analyzed for fasting blood glucose, insulin, total cholesterol, HDL, and triglycerides. Statistical analysis was performed using chi-square tests and t-tests to assess differences between groups.

Results

The study found a significant association between VPA use and increased weight (p=0.0056), waist circumference (p=0.0415), and BMI status (p=0.0502). Cholesterol levels were significantly higher in VPA users, with 8% showing abnormal values (p=0.0144). Triglyceride levels were markedly elevated in the case group compared to controls (p=0.0004), particularly in children aged 5–10 years. However, no significant differences were observed in fasting blood glucose (p=0.7032), insulin levels (p=0.9486), or HDL levels (p=0.7827) between groups.

Conclusion

Pediatric patients on long-term VPA therapy are at a higher risk of developing metabolic syndrome, particularly in the form of obesity and dyslipidemia. Regular metabolic screening and lifestyle interventions are crucial to mitigate these risks. Further studies are needed to establish standardized monitoring guidelines for children undergoing prolonged VPA therapy.

Keywords: *Epilepsy, Sodium Valproate, Pediatric Metabolic Syndrome, Obesity, Dyslipidemia, Antiepileptic Drugs*

1. INTRODUCTION

Epilepsy affects anything from 40 to 187 out of 100,000 children per year on a global scale. Sodium valproate, one of the mainly used anti-epileptic drugs, is effective against both partial and generalised seizures. It is crucial to assess the drug's safety due to its potential long-term use in youngsters. Along with many metabolic and endocrine adverse effects, weight gain is one of the most prevalent problems. The risk of problems such as dyslipidaemia, diabetes mellitus, and coronary artery disease increases when childhood obesity persists into adulthood. Considering this, we undertook a cross-sectional study of children on valproate for almost a year who suffered from epilepsy.

AIMS and OBJECTIVES:

This study aims to find the metabolic syndrome in children with epilepsy in India who have been on valproate medication for more than a year. The goal is to identify cases of metabolic syndrome early on and intervene quickly to avoid or control

them.

METHOD AND MATERIALS

The study takes place at the Vivekananda Institute of Medical Sciences in Kolkata, specifically in the Department of Paediatric Medicine and Neuromedicine. The academic year begins in March 2019 and ends in March 2020. Fifty patients and fifty healthy controls who are physically and demographically similar to the patients make up the sample population.

Inclusion criteria

- Epileptic patients who have been taking valproate alone for over a year and beyond.
- The age range is 2 to 12 years.

Exclusion criteria

- Medications that have the potential to change lipid profiles or blood glucose levels, such as insulin, steroids, statins, or various anti-epileptic drugs or medications.
- Kids with endocrinopathies, dyslipidaemia, obesity, hypertension, glucose intolerance, chronic liver disease, or kidney disease.
- Children who have a history of diabetes, hypertension, obesity, or dyslipidaemia in their family.

Methodology

We measured the patient's anthropometry after an in-depth medical history and physical examination. The formula for BMI is weight in kilogrammes separated by height in square meters. Middle of the xiphisternum and symphysis pubis was the measurement for the waist circumference. By World Health Organisation standards, a BMI greater than the 95th percentile and a waist circumference greater than the 90th percentile are indicators of obesity. We used a cuff of the right size to take the patient's blood pressure. Serum glucose, insulin, total cholesterol, HDL, and serum triglyceride were among the parameters examined in fasting blood samples. We used a calorimetric method to assess serum triglycerides, and an autozyme HDLC precipitating agent to determine HDL.

2. RESULT AND ANALYSIS

Researchers tabulated and analysed the study group's data using appropriate statistical procedures. In 50 cases, 18 patients were female and 32 patients were male in terms of age and sex.

Association between Age Group and Case-Control Status

Age Group (Years)	Case (n, %)	Control (n, %)	Total (n, %)
2-5	14 (56.0%)	11 (44.0%)	25 (100.0%)
>5-10	33 (48.5%)	35 (51.5%)	68 (100.0%)
>10	3 (42.9%)	4 (57.1%)	7 (100.0%)
Total	50 (50.0%)	50 (50.0%)	100 (100.0%)

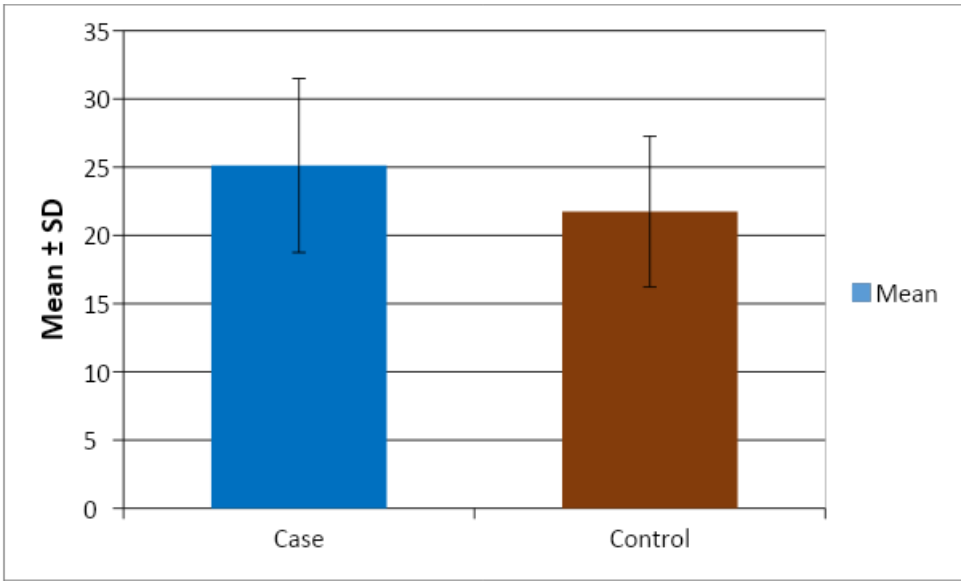
Chi-square value: .5617; p-value: 0.7551

Of the patients included in the case study, 14 (or 28.0%) were between the ages of 2 and 5, 33 (or 66.0%) were between the ages of 5 and 10, and 3 (or 6.0%) were older than 10 years old. Within the control group, 11 patients (22.0% of the total) were between the ages of 2 and 5, 35 patients (70.0% of the total) were between the ages of 5 and 10, and 4 patients (8.0%) were older than 10 years old. The correlation between age and group did not reach statistical significance (p=0.7551).

Distribution of Mean Weight (WT) by Group

Group	N	Mean	SD	Minimum	Maximum	Median	p-value
Case	50	25.12	6.37	13.00	33.00	25.00	0.0056
Control	50	21.74	5.52	13.00	34.00	21.00	

The average weight at full term (WT) (mean± s.d.) for patients in the Case Group was 25.1200 ± 6.3748. Patients in the Control Group had an average weight of 21.7400 ± 5.5247 (mean± s.d.). The mean WT differed significantly from both groups (p=0.0056).



Distribution of Mean Waist Circumference (WAIST CIR) by Group

Group	N	Mean	SD	Minimum	Maximum	Median	p-value
Case	50	64.30	8.59	50.00	77.00	64.00	0.0415
Control	50	61.18	6.34	50.00	76.00	61.00	

The patients in the Case Group had an average WAIST CIR of 64,300±8.5934, with a standard deviation of 8.5934. There was a mean waist-to-hip ratio (WHR) of 61.1800±6.3429 in the control group.

Association Between BMI Status and Group

BMI Status	Case (n, %)	Control (n, %)	Total (n, %)
Normal	41 (46.1%)	48 (53.9%)	89 (100.0%)
Obese	6 (85.7%)	1 (14.3%)	7 (100.0%)
Overweight	3 (75.0%)	1 (25.0%)	4 (100.0%)
Total	50 (50.0%)	50 (50.0%)	100 (100.0%)

Chi-square value: 5.1220; p-value: 0.0502

Out of the 82 patients in the Case Group, 41 were considered to be normal weight, 6 were considered obese, and 3 were considered to be overweight. There were 48 (or 96.0% of the total) normal-weight patients in the control group, 1 (or 2.0%) obese, and 1 (or 2.0%) overweight. At the 0.0502 level of significance, there was an association between BMI STATUS and group.

Association Between Cholesterol Status and Group

Cholesterol Status	Case (n, %)	Control (n, %)	Total (n, %)
Abnormal	4 (100.0%)	0 (0.0%)	4 (100.0%)

Borderline	6 (85.7%)	1 (14.3%)	7 (100.0%)
Normal	40 (44.9%)	49 (55.1%)	89 (100.0%)
Total	50 (50.0%)	50 (50.0%)	100 (100.0%)

Chi-square value: 8.4815; p-value: 0.0144

Four patients (8.0%) in the Case Group were considered ABNORMAL, six (12.0%) were considered BORDERLINE, and forty (80%) were considered NORMAL. One patient (2.0%) in the control group had borderline symptoms, while forty-nine patients (98.0%) had normal symptoms. It was statistically significant (p=0.0144) that CHOLESTEROL STATUS 1 was associated with group.

Association between Triglyceride Status and Group

Triglyceride Status	Case (n, %)	Control (n, %)	Total (n, %)
Abnormal	11 (100.0%)	0 (0.0%)	11 (100.0%)
Normal	39 (43.8%)	50 (56.2%)	89 (100.0%)
Total	50 (50.0%)	50 (50.0%)	100 (100.0%)

Chi-square value: 12.3596; p-value: 0.0004

There were 11 abnormal patients (22.0%) and 39 normal patients (78.0%) in the Case Group. There were 50 (or 100%) normal patients in the control group. At the 0.0004 level of significance, there was an association between TRIGLYCERIDE STATUS and the control group.

Association between Age (in Years) & Abnormal Triglyceride Values vs. Group

Age Group (Years)	Case (n)	Control (n)	P-Value
2-5 (n=14)	2	0	0.0455
5-10 (n=33)	8	1	0.0009
>10 (n=3)	1	0	0.1585
Total	11	1	—

Two patients were in the 2–5 age range, eight were in the 5–10 age range, and one was in the >10 age range in the case group. One patient in the Control Group was between the ages of 5 and 10.

Distribution of mean FBS: Group

		Numbe r	Mean	SD	Minimu m	Maximu m	Median	pvalue
FB S	Case	50	84.6200	8.1212	76.0000	95.0000	85.0000	0.703 2
	Contro l	50	84.0600	6.4378	74.0000	95.0000	84.0000	

Patients in the Case Group had an average FBS of 84.6200 ± 8.1212. The average FBS of the patients in the Control Group was 84.0600 ± 6.4378. As a whole, the two groups' mean FBS values were not significantly different (p=0.7032).

Distribution of mean INSULIN: Group

		Numbe r	Mean	SD	Minimu m	Maximu m	Media n	pvalue
INSULI N	Case	50	1.2860	.1654	1.1000	1.5000	1.3500	0.948 6
	Contro l	50	1.2840	.1434	1.1000	1.5000	1.3000	

Patients in the Case Group had an average INSULIN level of 1.2860 ± 1.1654. The average INSULIN levels in the Control Group were 1.2840 ±.1434. There was no statistically important difference (p=0.9486) in the mean INSULIN linking the two groups.

Distribution of mean HDL: Group

		Numbe r	Mean	SD	Minimu m	Maximu m	Media n	pvalue
HD L	Case	50	50.420 0	5.210 2	41.0000	60.0000	50.000 0	0.782 7
	Contro l	50	50.120 0	5.630 2	36.0000	60.0000	50.000 0	

As a whole, the patients in the Case Group had an HDL of 50.4200±5.2102. The average HDL of the patients in the Control Group was 50.1200± 5.6302. There was no statistically important difference (p=0.7827) in the mean HDL levels between the two groups.

3. DISCUSSION

Sodium valproate is one of the most widely used medications for the long-term control of epilepsy in children. When taken for an extended period of time, valproate causes a number of metabolic and endocrine problems, including weight gain. Six patients (12%) grew obese and three children (6%) were overweight out of fifty children receiving valproate treatment for more than a year, according to our study. When followed up for 12 months, a research by Abaci A et al(1), which had 30 children on valproate months, likewise found a substantial increase in BMI. Both Kanemura H et al.(2) and Pylvanen V et al.(3) came to similar results. Our research showed that total cholesterol (p=0.0144) was one of the metabolic markers that varied significantly. Only four out of fifty cases had abnormal levels [one male and three females]. The triglyceride levels of both the patients and the healthy controls changed significantly (p=0.0004). Triglyceride levels increased most significantly in the 5–10 age group (p=0.0009). the majority were women. men and women. We found abnormal triglycerides in 6 out of 11 patients. Verrotti et al. (4) and Tekgul et al. (5), on the other hand, looked at cholesterol and triglyceride levels over 2.5 and 2 years, respectively, and found no significant differences. In India, there is a dearth of research on this topic. In 2015, Aditi et al. (6) performed the most renowned study to date, comparing metabolic characteristics in children treated with valproate vs phenytoin. On the other hand, a 2008 study by Dewan et al. compared valproate and phenytoin-induced metabolic disturbances and found no statistically significant differences in total cholesterol or triglycerides.

4. CONCLUSION

Patients with epilepsy who had used VPA had a higher risk of metabolic syndrome compared to the whole population, according to this study. We can use this data to better understand valproate-related metabolic syndrome and how to intervene in a timely manner. Children using valproate may so experience the lipid problems. Regular checkups and advice on how to make positive changes to one's way of life could be necessary. At all times, it is important to evaluate children for cardio-metabolic risk factors at regular intervals. Our results suggest a need for additional study into the best practices for routinely evaluating children undergoing long-term valproate medication for metabolic abnormalities.

REFERENCES

[1] Hideaki K . et al. Valproate sodium enhances body weight in patients with childhood epilepsy : A pathogenic mechanism and open label clinical trial of behaviour therapy. Seizure ; 2012 : 496 -500

[2] Abaci A, Saygi M, Yis U, Demir K, Dirik E, Bober E. Metabolic alterations during valproic acid treatment: a prospective study. Pediatric neurology. 2009 Dec 1;41(6):4359.

[3] Pylvänen V, Pakarinen A, Knip M, Isojärvi J. Insulin-related metabolic changes during treatment with valproate in patients with epilepsy. Epilepsy & Behavior. 2006 May 1;8(3):643-8.

[4] Verrotti A, La Torre R, Trotta D, Mohn A, Chiarelli F. Valproate-induced insulin resistance and obesity in children. Hormone Research in Paediatrics. 2009;71(3):125-31.

[5] Tekgul H . et al . Serum lipid profile in children receiving antiepileptic drug mono therapy: is it atherogenic? Journal of paediatric endocrinal metab.2006 :19: 1151 -55.

[6] Dhir A, Sharma S, Jain P, Bhakhri BK, Aneja S. Parameters of metabolic syndrome in Indian children with epilepsy on valproate or phenytoin monotherapy. Journal of pediatric neurosciences. 2015 Jul;10(3):222.

[7] Dewan P, Aggarwal A, Faridi MM. Effect of phenytoin and valproic acid therapy on serum lipid levels and liver function tests. Indian pediatrics. 2008 Oct 1;45(10):855.

.