ASSOCIATION BETWEEN SERUM ALBUMIN LEVELS WITH THE PERCENTAGE AND LOCATION OF EDEMA IN CHILDREN WITH NEPHROTIC SYNDROME AT RSUP DR. MOHAMMAD HOESIN PALEMBANG 2016-2017

Ainun Mardiyyah[1], Hertanti Indah Lestari[2], Atika Akbari[3]

1. Medicine Education Study Program, Faculty of Medicine, Universitas Sriwijaya, Palembang, 30126, Indonesia
2,3. Departement of Pediatrics Health Science, Rumah Sakit Mohamad Hoesin Palembang,30126, Indonesia
Email: aimrdyyh@gmail.com

Abstrak

Edema merupakan gejala klinis utama pada anak penderita sindrom nefrotik (SN).Edema pada SN terbagi menjadi edema lokal dan anasarka yang dapat dijelaskan dengan teori *underfill* dimana hipoalbuminemia merupakan faktor kunci terjadinya edema. Selama ini persentase edema anak penderita SN hanya perkiraan, sedangkan berat badan kering anak penderita SN diperlukan untuk menghitung dosis kortikosteroid secara tepat. Penelitian ini bertujuan untuk mengetahui hubungan antara kadar albumin serum dengan persentase dan lokasi edema pada anak penderita sindrom nefrotik di RSUP Dr. Mohammad Hoesin Palembang periode 2016-2017. Penelitian ini merupakan penelitian observasional analitik dengan pendekatan *cross sectional* menggunakan data sekunder. Sampel diambil dengan menggunakan metode *consecutive sampling* dari seluruh data rekam medik pasien anak penderita SN di RSUP Dr. Mohammad Hoesin Palembang. Subjek terdiri dari 26 (56,5%) anak laki-laki dan 20 (43,5%) anak perempuan dengan usia rata-rata 7 tahun 2 bulan. Klasifikasisindrom nefrotik yang paling banyak ditemui adalah sindrom nefrotik inisial yang berjumlah 15 orang (32,6%). Rata-rata kadar albumin terendah dapat ditemui pada kelompok usia 4-6 tahun (1,55 g/dL) sedangkan tertinggi pada kelompok usia 13-15 tahun (2,06 g/dL). Rata-rata persentase edema tertinggi terdapat pada kelompok usia 1-3 tahun (17,38%) sedangkan terendah pada kelompok usia 16-17 tahun (3,98%). Pasien yang mengalami edema anasarka (56,5%) lebih banyak dibandingkan dengan edema lokal (43,5%). Analisis korelasi Spearman menunjukkan hubungan yang sangat bermakna (p=0,003) dengan kekuatan sedang (r=-0,424) antara kadar albumin serum dan persentase edema. Analisis Mann-Whitney (p=0,048) menunjukkan terdapat hubungan antara kadar albumin serum dan lokasi edema. Terdapat korelasi yang bermakna antara kadar albumin serum dan persentase edema. Terdapat hubungan yang bermakna antara kadar albumin serum dan lokasi edema.

Kata Kunci: Sindrom Nefrotik, Hipoalbuminemia, Persentase Edema, Edema Lokal, Edema Anasarka

Abstract

Association Between Serum Albumin Levels With The Percentage And Location Of Edema In Children With Nephrotic Syndrome At RSUP Dr. Mohammad Hoesin Palembang 2016-2017. Edema is a main clinical symptom in children with nephrotic syndrome. Edema in nephrotic syndrome divide into local and anasarca edema which can be explained by the underfill theory where hypoalbuminemia is the key. So far the percentage of edema in nephrotic syndrome is count by estimacy, while the dry weight of nephrotic syndrome patients is required to count the corticosteroid dose needed. This study seeks to determine the association between serum albumin levels with the percentage and location of edema in children with nephrotic syndrome at RSUP Dr. Mohammad Hoesin Palembang 2016-2017. This is a analytic observational research with cross-sectional design using secondary data. The sampling method was using consecutive sampling to all of medical records of children with nephrotic syndrome at RSUP Dr. Mohammad Hoesin Palembang. Subjects were consisted of 26 (56,5%) boys dan 20 (43,5%) girls, with the average age of 7 years and 2 months old. The most common nephrotic syndrome classification is initial nephrotic syndrome (32,6%). The lowest average of serum albumin levels can be found in the age of 4-6 years old (1,55 g/dL) while the highest can be found in the age of 13-15 years old (2,06 g/dL). The highest average of edema percentage can be found in the age of 1-3 years old (17,38%) while the lowest can be found in the age of 16-17 years old (3,98%). Majority of the patients is having anasarca edema (56,5%). The spearman analysis shows a significant correlation (p=0,003) with moderate power (r=-0,424) between serum albumin levels and the percentage of edema. Mann-Whitney shows (p=0,048) an assosiation between serum albumin levels and the location of edema. There are a significant correlation between serum albumin levels and the percentage of edema and a significant assosiation between serum albumin levels and the location of edema.

Keywords: Nephrotic Syndrome, Hypoalbuminemia, The Percentage of Edema, Local Edema, Anasarca Edema

1. INTRODUCTION

Nephrotic syndrome (NS) is an clinical syndrome with massive proteinuria (≥ 40 mg / m2 LPB / hour or 50 mg / kg / day or urine protein / creatinine ratio when> 2 mg / mg or dipstick ≥ 2+), hypoalbuminemia ≤ 2.5 g/dL, edema and can be accompanied by hypercholesterolemia> 200 mg/dL as the symptoms.[1]

Nephrotic syndrome can attack children from all ages, especially children in school ages or teenagers/adolescents. The prevalence of NS in the world is around 16 cases per 100,000 children.[2] The incidence of NS in Indonesia for children aged less than 14 years is 6 per 100,000 per year with a ratio of males and females 2:1.[1] RSUP Dr. Mohammad Hoesin Palembang noted that there were 263 Nephrotic syndrome (NS) patients under the age of 14 who were hospitalized in the period of 2012-2015 with a total of 182 male patients and a total of 81 female patients.

Edema in NS can be explained by the theory of underfill and overfill. The underfill theory explains that hypoalbuminemia is the key factor for edema to occur in NS. Hypoalbuminemia causes a decrease in intravascular plasma oncotic pressure and the shifting of plasma fluid into the interstitial space resulting in hypovolemia and the kidneys compensating by increasing water and sodium retention. This mechanism will improve intravascular volume as well as exacerbate the occurrence of hypoalbuminemia so that the edema continues.[3]

According to the research done by Novina, Gurnida, and Sekarwana on 2014, the correlation of the level of albumin serum with edema percentage with Rank Spearman test shows a meaningful negative relation (p = 0,006) with the correlation coefficient r = -0,501. Which means, the lower the level of albumin serum, the bigger the edema percentage in children who suffer Nephrotic syndrome (NS) in its special attack at Rumah Sakit Dr. Hasan Sadikin Bandung, RSU Cibabat, and RSU Ujung Berung.[4]

There are few difference on this research with the previous research, whci is the characteristics of samples, location grouping of edema on children who suffer NS which is reviewed from the level of albumin serum and edema percentace which will be grouped according to the age of the children who suffer NS.

After all this time, edema percentage of children who suffer NS is estimated, while the dry body weight of children who suffer NS is needed to count the dose of corticosteroid precisely, because the toxicity of distribution of corticosteroid is potentially life-threatening, so that the risks and benefits of therapy must be evaluated regularly.[4] The purpose of this research is to determine the relation berween the level of albumin serum and the percentage and location of edema on children who suffer Nephrotic syndrome or NS in RSUP Dr. Mohammad Hoesid Palembang on the period of 2016-2017.

2. METHODS

This research is an analytic observational research with cross sectional research design. The data is obtained through the medical record observation in RSUP Dr. Mohammad Hoesin Palembang. This research will be done on August to December of 2018. The research samples are all of the NS patients in the age of 1-17 years old in the Polyclinic and Ward of Nephrology of the RSUP Dr. Mohammad Hoesin Palembang in the period of 2016-2017 which fullfill the inclusion criteria. The sampling was done by consecutive sampling, and has been successfully collected as many as 46 people as samples.

The inclusion criteria of this research is all NS patients in the age of 1-17 years old in the Polyclinic and Ward of

Nephrology of the RSUP Dr. Mohammad Hoesin Palembang in the period of 2016-2017. The exclusion criteria of this research is pediatric patients who suffer secondary NS, children patients who suffer NS who have body that weight less than ideal weight, medical records that don't have any variable data needed (age, gender, address, referral, treatment history of diuretics, weight, height, the level of albumin serum and location of edema), and pediatric patients with NS who are currently receiving the treatment for diuretic.

Univariate analysis is done to obtain an overview of the distribution frequency of albumin serum level, the edema percentage and the characteristics of edema patients aged 1-17 years old in RSUP Dr. Mohammad Hoesin Palembang in the period of 2016-2017 including age, gender, address, referral, diagnosis of NS (initial NS, relapse, frequent NS relaps, steroid dependent NS and steroid resistant NS) and location of edema (local edema; palpebral edema, pretibial edema, dorsum pedis edema, genital edema, ascites, pleural effusion and anarchic edema). In this study, the statistical test used for numerical bivariate analysis in knowing the correlation between serum albumin levels and the edema percentage was the Spearman correlation test (abnormal data distribution). While the statistical test used for bivariate analysis in knowing the relationship between serum albumin levels and the location of edema was the Mann-Whitney test (because the location variable has two categories). The size of the relationship is expressed by a number called the relationship coefficient or correlation coefficient.

3. RESULT

From the total of 46 research subjects characteristics analyzed, including their age, gender, address, and refferal (Table 1). The average age of patients with NS patients is 7 years 2 months old. The age range of the patients most commonly found is the age group 1-3 years old as many as 13 patients (28.3%) and the least encountered is the age group of 10-12 years old and 16-17 years old which have a total of 2 patients (4.3%) for each range category.

The distribution of pediatric NS patients in RSUP Dr. Mohammad Hoesin Palembang according to gender shows the ratio of 1,3:1 with a total of 25 male patients (26,5%) and 20 female patients (43,5%). Based on the data distribution of patients' address, found that 32 patients (69,6%) are living outside of Palembang, which is more than 14 patients (30,4%) who are living in Palembang. From the 46 patients, 3 patients (6.5%) is referral patients from other hospitals and 43 patients (93.5%) were not referred patients.

Table 1. The Distribution of Children who Suffer NS Frequency in RSUP Dr. Mohammad Hoesin Palembang according to Characteristics (N = 46).

Characteristics	n	%
Age (Years Old)		
1-3	13	28,3%
4-6	9	19,6%
7-9	11	23,9%
10-12	2	4,3%
13-15	9	19,6%
16-17	2	4,3%
Gender		
Male	26	56,5%
Female	20	43,5%
Address		
Inside Palembang	14	30,4%
Outside Palembang	32	69,6%
Referral		
Yes	3	6,5%
No	43	93,5%

The distribution of pediatric patients who suffer from NS in RSUP Dr. Mohammad Hoesin Palembang based on the NS classification is showed on Table 4. From 46 patients, found that the frequently found NS diagnosis is initial NS in 15 people (32,6%) and the least found NS diagnosis is steroid resistance NS in 3 people (6,5%).

The distribution of edema location on 46 pediatric NS patients is showed on Table 2. Based on the data, patients who come with anarchic edema complaints are counted to a total of 26 people (56.5%), while patients with complaints of local edema are counted to a total of 20 people (43.5%). The most common local edema is palpebral edema with a total of 19 people (41.3%).

Table 2. The Distribution of Children who Suffer NS Frequency in RSUP Dr. Mohammad Hoesin Palembang according to NS Classification and Edema Location (N = 46).

Nephrotic Syndrome Classification	**N**	**%**
Initial Nephrotic Syndrome	15	32,6%
Relaps Nephrotic Syndrome	13	28,3%
Frequent Relaps Nephrotic Syndrome	11	23,9%
Steroid Dependent Nephrotic Syndrome	4	8,7%
Steroid Resistance Nephrotic Syndrome	3	6,5%
Edema Location	n	%
Local Edema	20	43,5%
– Edema palpebra	19	41,3%
– Edema pretibial	12	26,1%
– Edema dorsum pedis	0	0%
– Edema genital	1	2,2%
– Asites	12	26,1%
– Efusi pleura	0	0%
Anasarka Edema	26	56,5%

Based on the data above, known that the lowest levels of albumin are 0.7 g/dL and the highest albumin level is 3.7 g/dL. Data was then analyzed so that the mean serum albumin level (mean) was 1.8 g/dL, the median was 1.6 g/dL and the standard deviation was 0.81 g/dL. Based on the data obtained, it is known that the lowest average albumin level can be found in the 4-6 year age group (1.55 g/dL) while the highest average albumin level can be found in the 13-15 year age group (2.06 g/dL).

Based on the data obtained, found that the lowest edema percentage was 0.72% and the highest edema percentage was 42%. Data was then analyzed so that the average edema percentage (mean) was 12.88%, median was 9.28% and deviation standard was 10.31%.

Based on the data obtained, it was found that the highest edema percentage was found in the age group 1-3 years old (17.38%) while the lowest edema percentage was found in the age group 16-17 years old (3.98%).

Table 3. The Distribution of Albumin Serum Level Frequency according to The Age Of Pediatric NS Patients in RSUP Dr. Mohammad Hoesin Palembang (N = 46).

Age (Years Old)	**Average of Albumin Serum Level**
1 – 3	1,7 g/dL
4 – 6	1,55 g/dL
7 – 9	1,85 g/dL
10 – 12	1,85 g/dL
13 – 15	2,06 g/dL
16 – 17	2 g/dL

Table 4. The Distribution of Edema Percentage Frequency according to The Age Of Pediatric NS Patients in RSUP Dr. Mohammad Hoesin Palembang (N = 46).

Age (Years Old)	**Average of Edema Percentage**
1 – 3	17,38%
4 – 6	9,63%
7 – 9	15,56%
10 – 12	10,7%
13 – 15	8,8%
16 – 17	3,98%

Spearman's correlation test evaluate that the strength of the correlation, the value of p and the direction of correlation of serum albumin levels and the edema percentage. The test results state that there is a significant correlation between the two tested variables ($p < 0.05$). Based on data analysis, the correlation between serum albumin levels and edema percentage had moderate strength ($r = 0.4$-0.599) (Table 5). The direction of the correlation in this analysis is negative (inverse correlation, where the greater the value of serum albumin level, the smaller the percentage value of edema).

Table 5. The Correlation of Albumin Serum Level and Edema Percentage.

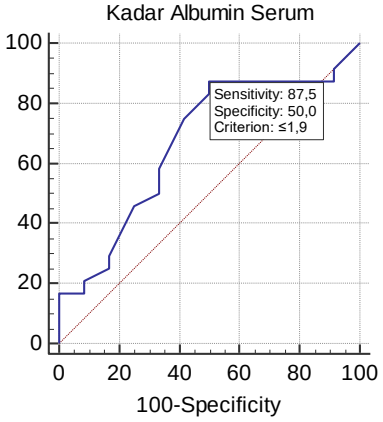
Average of Albumin Serum Level	Average of Edema Percentage	r	*p value*
1,8 g/dL ± 0,81 g/dL	12,88% ± 10,31%	-0,424	0,003

In this research, the cutoff value of 9.28% edema percentage was determined based on the median of edema percentage. The analysis of the mean difference in serum albumin levels based on the cutoff value of the edema percentage was carried out using Mann-Whitney analysis (Table 6.). The results of the analysis show that there is a statistically significant relationship between the mean difference in serum albumin level based on a cutoff value of 9.28% (p = 0.031). Based on the ROC curve, it was found that the edema percentage ≥ 9.28% correlated with albumin level <1.9 g/dL with a sensitivity of 87.5% and specificity of 50% (Figure 1.). The AUC value obtained is 0.67 which means the level of accuracy is weak (0.6-0.7).

Table 6. The Difference on Average of Albumin Serum Level based on Edema PercentageCutoff.

Edema Pecentage	Average of Albumin Serum Level	*p value*
< 9,28%	2,048 g/dL ± 0,83 g/dL	0,031
≥ 9,28%	1,55 g/dL ± 0,73 g/dL	

Figure 1. ROC Curve of Albumin Serum Level based on Edema PercentageCutoff.

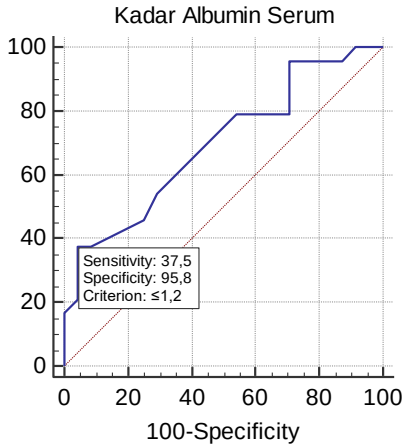


The result from normality test state that the numerical data of serum albumin level are not normally distributed (p <0.05). The implications for the selection of relationship statistical tests carried out according to the Mann-Whitney method (Table 7.). The results of the analysis showed that there was a significant correlation between the mean differences in serum albumin levels based on the location of edema (p = <0.05). Based on the ROC curve, it was found that anal edema was associated with albumin levels ≤ 1.2 g/dL with a sensitivity of 37.5% and specificity of 95.8% (Figure 2.). The AUC value obtained is 0.696 which means the level of accuracy is weak (0.6-0.7).

Table 7. The Difference on Average of Albumin Serum Level based on Edema Location.

Edema Location	Average of Albumin Serum Level	p value
Local Edema	2,06 g/dL ± 0,89 g/dL	0,048
Anasarka Edema	1,6 g/dL ± 0,7 g/dL	

Figure 2. ROC Curve of Albumin Serum Level based on Edema Location.



4. DISCUSSION

The results of the research done in the Medical Record Installation of RSUP Dr. Mohammad Hoesin Palembang were found that the average age of children with NS was 7.13 ± 4.59 years and most (28.3%) children with NS were in the age group of 1-3 years old. This

result is not much different from previous research. In a study conducted by Nilawati in 2012, 76% of children with NS occurred at the age of 5-9 years old.[5] Research that was done at Dr. Hasan Sadikin Bandung showed the average age of NS children was 6.80 ± 3.39 years old.[6] The peak age of NS incidence in children is 3-6 years old with an average of 6.7 ± 3.3 years.[7]

In this study, 26 patients (56.5%) were male and 20 (43.57%) were female. The ratio of males to females in this study was 1.3: 1. This result is in line with the research conducted at Dr. RSUP M. Djamil Padang obtained an NS incidence ratio for males and females of 1.43:1.[8] Research done by Raharja in 2014 also showed that based on gender most of the patients with NS patients were males 37 (57.8%) with a ratio of men and women ranging from 1.4:1.[9]Research shows that males experience more NS with different ratios, but there is no evidence of the role of gonosom (gender chromosome genes) in NS. This NS event is caused by glomerular filtration barrier which causes proteinuria seen as NS, this barrier damage is caused and can be inherited from a number of genetic mutations that cause damage in various regions of this system, genetic mutations in the form of autosomal NS can be dominant autosomal or recessive autosomal.[10]

The results of the distribution of NS patients in Dr. RSUP Mohammad Hoesin Palembang based on the residence or address is dominated by patients who live outside Palembang with a subject of 32 patients (69.6%), while patients who live Palembang are in the total of 14 patients (30.4%). Based on the reference distribution, patients with NS patients were found most in the category of patients who were not referral patients. There were 3 patients (6.5%) who were referral patients from other hospitals and 43 patients (93.5%) were patients who came to RSUP Dr. Mohammad Hoesin Palembang from outpatient installation, inpatient installation and Emergency Room Installation (IGD).

In this research, found that children with NS with the diagnosis of initial NS were the most likely found NS, which on 32.6%, this result was similar to the research of Raharja (2014) in RSUP Fatmawati in Jakarta, at 67.2%. The results also showed that the distribution of relapse NS (28.3%) was higher than that of frequently relaps NS (23.9%), this result was different from the research of Raharja (2014) which was done at Fatmawati Hospital that frequently relapse NS (57.8%) are more than relapse NS (28.1%). It shown that NS relapses if proteinuria ≥ 2+ or> 40 mg / m2 LPB / hour for 3 consecutive days in 1 week, while frequently relapse NS occurs if relapsing ≥ 2x in the first 6 months after initial response or ≥ 4x within a period of 1 year.[1]

Child patients with NS at RSUP Dr. Mohammad Hoesin Palembang who came with symptoms of local edema (palpebral edema, pretibial, ascites, and genital edema) has a total of 20 people (43.5%), while patients who came with symptoms of anal edema has a total of 26 people (56.5%) from a total of 46 patients. The same thing was found on the research done by Novina, Gurnida and Sekarwana in 2014, that all patients with NS showed palpebral edema, dorsum pedis, and pretibial.4 In the category of local edema, no respondent had dorsum pedis edema or pleural effusion because there was no data on patient medical record.

On the research done by Raharja in 2014, it was found that almost all patients came due to complaints of edema as many as 61 patients (95.3%) while some patients came with other complaints that could arise due to complications from NS including seizures of 2 patients (3.1%) and fever in 1 patient (1.6%). 9 Similar was reported by Nilawati in 2012, most patients presented with swelling complaints are 62 patients (91%) and others who came with complaints of fever, convulsions, and shocks.[5]

The lowest serum albumin level was 0.7 g/dL and the highest serum albumin level was 3.7 g/dL. The mean serum albumin level (mean) is 1.8 g/dL, the median is 1.6 g/dL and the standard deviation is 0.81 g/dL. In the 2014 study of Novina, Gurnida and Sekarwana, serum albumin levels of 1.45 (SB 0.43) g/dL with the lowest levels were 0.9 g/dL and the highest was 2.4 g/dL.[4]

Nephrotic syndrome (NS) is a clinical syndrome with symptoms of hypoalbuminemia ≤ 2.5 g/dL. 1 Edema will begin when albumin levels are <2.7 g/dL and are always found when albumin levels <1.8 g/dL. 12 in children with minimal lesions with edema symptoms arise when albumin levels range from 1.1 to 1.9 g/dL, whereas children with non-minimal lesions range from 0.6 to 1.0 g/dL.[13]

The decrease of albumin serum level on NS patients are caused by the increase of the permeability of glomerulus capiller to albumin that caused massive proteinuria and the level of albumin serum decrease. Although the albumin synthetic in hepar increase to 3-4 times, it is not enoufh tu comprehend the lose of albumin, although the amount of albumin degradation is in the normal or below than normal.[14]

The lowest albumin serum level can be found on the group of age 4-6 years old (1,55 g/dL). While the highest albumin serum level can be found on the group of age 13-15 years old (2,05 g/dL). On the research done by Novina, Gurnida, and Sekarwana on 2014, every subject shows that the decrease of albumin serum level with average albumin serum level is 1,45 (SB 0,43) g/dL, the lowest level is 0,9 g/dL, and the highest is 2,4 g/dL.[4]

The lowest edema percentage was 0.72% and the highest edema percentage was 42%. The mean of edema percentage (mean) was 12.88%, median was 9.28% and standard deviation was 10.3%. The results of previous researches showed that the mean from edema percentage of 21.6% (SB 11.4) with the lowest value was 6% and the highest was 46%.[4]

Edema will be clearly seen when the fluid retention reaches 3-5% of body weight.15 Based on the underfill theory, hypoalbuminemia is a key factor in the occurrence of edema in NS. Hypoalbuminemia causes a decrease in intravascular plasma colloid oncotic pressure, resulting in extravasation of fluid into the interstitial space causing edema. The decrease in plasma volume in intravascular stimulation is the emergence of renal water and sodium retention as the body's effort to maintain normal intravascular volume and pressure. Fluid retention further results in plasma dilution which can reduce plasma oncotic pressure thereby accelerating extravasation of fluid into the interstitial space. The intravascular volume is less stimulating renin secretion to stimulate renin-angiotensin-aldosterone activity so that urine production is reduced, concentrated and sodium levels are low due to sodium and water retention.16 The results of this study indicate that the Shapiro-Wilk normality test data is not normally distributed (p <0 , 05) and the Spearman correlation test (p = 0.003) shows that there is a significant correlation between serum albumin levels and the percentage of edema (p <0.05). Based on data analysis, the correlation between serum albumin levels and the percentage of edema has a moderate correlation strength (r = -0.424). The direction of correlation in this analysis is negative, the greater the value of serum albumin level, the smaller the percentage value of edema.

At the Department of Pediatrics Health, Faculty of Medicine, Universitas Padjajaran, Rumah Sakit Dr. Hasan Sadikin in Bandung, found that there is a significant negative relationship (p = 0.006) between serum albumin level and the edema percentage with the correlation coefficient r = -0.501 using the Spearman's correlation test. So, the lower the serum albumin level will lead to the

greater the percentage of edema in pediatric patients with NS.[4]

The relationship assessment begins with the Shapiro-Wilk normality test to see the distribution of serum albumin levels. The results of the normality test state that the numerical data of serum albumin levels are not normally distributed (p <0.05). This has implications for the selection of relationship statistical tests carried out according to the Mann-Whitney method.

The cutoff value of 9.28% edema was determined based on the median percentage of edema. Analysis of the mean difference in serum albumin levels based on the cutoff value of the percentage of edema was performed using Mann-Whitney analysis. In the percentage of edema <9.28%, the average serum albumin level of the patient was 2.05 g/dL 88 0.88 g/dL. While the percentage of edema was ≥9.28%, the mean serum albumin level of patients was 1.55 g/dL ± 0.73 g/dL (Table 6.).

The results of the analysis show that there is a statistically significant relationship between the mean difference in serum albumin levels based on a cutoff value of 9.28% (p = 0.031). Based on the ROC curve, it was found that the percentage of edema ≥ 9.28% correlated with albumin level <1.9 g/dL with a sensitivity of 87.5% and specificity of 50%. The AUC value obtained is 0.67 which means the level of accuracy is weak (0.6-0.7).

The relationship assessment begins with the Shapiro-Wilk normality test to see the distribution of serum albumin level data which states that the numerical data of serum albumin levels are not normally distributed (p <0.05). This has implications for the selection of relationship statistical tests carried out according to the Mann-Whitney method.

The results of this research showed that the Mann-Whitney analysis (p = 0.048) showed that there was a significant relationship between serum albumin level and the location of edema which was divided into local edema and anal edema (p <0.05). Based on the ROC curve, it was found that anal edema was associated with albumin levels ≤ 1.2 g/dL with a sensitivity of 37.5% and specificity of 95.8%. The AUC value obtained is 0.696 which means the level of accuracy is weak (0.6-0.7).

In patients who showed symptoms of local edema, the average og serum albumin level on patients was 2.06 g/dL± 0.89 g/dL. While in patients with symptoms of anal edema, the average serum albumin level of patients is 1.6 g/dL 7 0.7 g/dL.

A person will be diagnosed having nephrotic syndrome (NS) if there are several clinical manifestations, one of which is hypoalbuminemia ≤ 2.5 g/dL.1 Edema in NS will start to occur if albumin levels <2.7 g/dL and are always found when albumin levels are <1, 8 g/dL.[12] Symptoms of edema in children with NS minimal lesions increase when albumin levels range from 1.1 to 1.9 g/dL, whereas children with non-minimal lesions range from 0.6 to 1.0 g/dL.[13]

5. CONCLUSION

The conclusion of this research is there are meaningful correlations between albumin serum level with the edema percentage and there are meaningful relation between albumin serum level and the location of edema.

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BIODATA

Penulis 1

Nama : Ainun Mardiyyah

NIM : 04011381520096

Email : aimrdyyh@gmail.com

Instansi : Program Studi Pendidikan Dokter, Fakultas Kedokteran, Universitas Sriwijaya

Penulis 2

Nama : dr. Hertanti Indah Lestari, SpA(K)

NIP : 197610092008012015

Instansi : Departemen Ilmu Kesehatan Anak, RSUP Dr. Mohammad Hoesin Palembang, Fakultas Kedokteran, Universitas Sriwijaya

Penulis 3

Nama : dr. Atika Akbari, SpA

NIP : 198803092015042003

Instansi : Departemen Ilmu Kesehatan Anak, RSUP Dr. Mohammad Hoesin Palembang, Fakultas Kedokteran, Universitas Sriwijaya