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RELATIONSHIP BETWEEN RED DISTRIBUTION WIDTH (RDW) AND PEDIATRIC APPENDICITIS SCORE (PAS)IN DETERMINING THE SEVERITY DEGREE OF ACUTE APPENDICITIS IN CHILDREN IN H. ADAM MALIK HOSPITAL MEDAN

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Abstract

Introduction: One of the sign of inflammation are the red distribution width (RDW) and neutrophils lymphocyte ratio (NLR). The width of the distribution of red blood cells (RDW) is a measure of the size of circulating erythrocytes. We aim to assess the association of RDW with pediatric appendicitis score (PAS) to determine the severity degree of acute appendicitis in children.

Material Methods: A non-experimental study using a retrospective descriptive method was conducted at the Department of Surgery in the Pediatric Surgery Division of the H. Adam Malik Hospital in Medan with data taken based on the medical records of inpatients and outpatients ≤ 18 years old with a diagnosis of acute appendicitis at the H. Adam Malik General Hospital from January 2015 to December 2017. Data to be collected, processed, and analyzed descriptively.

Result: From the data, showed that of the 40 patients who became the study sample consisted of 28 men (70%) and 12 women (30%). The median age of all samples in this study was 11 years, with the youngest being 0 years to the most mature is 18 years. For the median value of the distribution of red blood cells (RDW) is 12.95 with a minimum value of 11.50 and a maximum value of 18.30. Whereas the median value of Pediatric Appendicitis Score (PAS) is 4.50 with a range of values from 1 to 9.

Conclusion: We found that the relationship between red blood cell distribution (RDW) and pediatric appendicitis score (PAS) were statistically significant, which were analyzed using Spearman correlation data analysis with correlation results (r) = 0.508 and p value of 0.001.

Introduction

Acute appendicitis in pediatric patients is one cause of acute abdominal conditions that require immediate surgery. The incidence of acute appendicitis in pediatric patients in the world from 1 to 8% of all pediatric patients coming to the emergency department with acute acute abdomen. Appendicitis is rare in children under 5 years of age, and very rarely in the first year of life. In some instances, boys are more often than girls in around 55% to 65% of patients. The incidence rate of appendicitis in the age group of children is around 30% to 40%. Appendicitis in neonates is very rare, and surgeons must be wary of conditions that accompany it, such as Hirschsprung's disease and necrotic enterocolitis.

Laboratory findings can help in diagnosis, but one laboratory value is still very common. One increase in leukocyte counts (11,000 - 16,000 / mm3) is the most frequent finding. A significant increase in the number of leukocytes indicates perforation. However, normal leukocyte counts also do not exclude appendicitis. One of the sign of inflammation are the red distribution width (RDW) and neutrophils lymphocyte ratio (NLR). The width of the distribution of red blood cells (RDW) is a measure of the size of circulating erythrocytes. Children with appendicitis, whether perforated or not, had a significant increase in red blood cell color compared to those without appendicitis ($p < 0.001$), but there was no significant difference in the red blood cells of children with simple appendicitis or perforation ($p = 0.081$). Neutrophils and lymphocyte levels are derived from differential leukocyte counts which are a component of routine blood tests. Various studies have shown an increase in neutrophil (neutrophilic) numbers and a decrease.

Appendicitis is a common cause of acute abdominal pain that requires emergency surgery, and covers every age group. Acute appendicitis is still a major problem in the child's gastrointestinal system, diagnosing and deciding

on surgery is often difficult. This is because the clinical symptoms are almost the same as other diseases and in children often do not find typical symptoms of right lower pain (McBurney's point), as in adult appendicitis. Resulting in late diagnosis and late arrival of patients in the emergency department. It was reported that more than 50% found perforated appendicitis at the first visit. Therefore, acute appendicitis is still a morbidity in children. The morbidity rate of acute appendicitis in children is 2.1%, while in adulthood is 9.1% -23%.Where morbidity for surgical wound infections occurs in 1-5% of cases.

Clinically the diagnosis of appendicitis is generally divided into two groups, simple appendicitis including 'non-inflammatory' (normal appendix), 'acute inflammation', 'phlegmonous', 'acute', 'suppurative', 'inflammation' being with or without peritonitis'. This condition also includes minimal appendicitis, early appendicitis, and uncomplicated appendicitis. Whereas complicated appendicitis includes 'gangrenous appendicitis', perforated appendicitis 'local pus heaps during surgery', 'general peritonitis', and 'intra-abdominal abscess'.

In 1992, the United States Centers for Disease Control (CDC) revised the definition of 'wound infection' into a new definition of 'surgical wound infection' to prevent misunderstanding between infection in the surgical incision and infection in trauma injuries. Surgical wound infectionis a treatment-related infection where wound infections occur due to surgical procedures, especially appendectomy surgery in this study, and can add to the heavy economic burden on patients, although most surgical wound infection is superficial but still increases the incidence of morbidity and mortality.

Material and methods

A non-experimental study using a retrospective descriptive method was conducted at the Department of Surgery in the Pediatric Surgery Division of the H. Adam Malik Hospital in Medan with data taken based on the medical records of inpatients and outpatients at the H. Adam Malik General Hospital from January 2015 to December 2017. The inclusion data is ≤ 18 years old with a diagnosis of acute appendicitis, and the exclusion data is > 18 years old patients. Data to be collected, processed, and analyzed descriptively using Spearman correlation.

Result

From the data, showed that of the 40 patients who became the study sample consisted of 28 men (70%) and 12 women (30%). The median age of all samples in this study was 11 years, with the youngest being 0 years to the most mature is 18 years. For the median value of the distribution of red blood cells (RDW) is 12.95 with a minimum value of 11.50 and a maximum value of 18.30. Whereas the median value of Pediatric Appendicitis Score (PAS) is 4.50 with a range of values from 1 to 9.

Table1. Demographic Characteristics of Research

Characteristics	n (%)	Median (Min-Max)
Gender		
Male	28 (70)	
Female	12 (30)	
Age		11,00 (0-18)
Red Distribution Width (RDW)		12,95 (11,50-18,30)
PediatricAppendicitisScore(PAS)		4,50 (1-9)

In table2. showed the relationship between red blood cell distribution (RDW) and pediatric appendicitis score (PAS) which were analyzed using Spearman correlation data analysis with correlation results (r) = 0.508. This result is statistically significant with a p value of 0.001.

Table2. Relationship between Red Blood Cell Distribution (RDW) and Pediatric Appendicitis Score (PAS)

	Corelation (r)	p-value
RDW and PAS	0,508	0,001*

*Data analysis using Spearman correlation, p value <0.05 showed statistically significant results.

Discussion

Increased RDW associated with inflammatory states. The predictive role of RDW is also seen by several other pathological diseases such as bacteremia, sepsis, and sepsis shock. Other studies have shown that patients with histologically enforced acute appendicitis have higher RDW values compared to without appendicitis, but the diagnostic value of RDW can be superior to leukocytes and C-reactive protein (CRP) in children with acute appendicitis.

Pediatric Appendicitis Score (PAS) is an assessment score consisting of 8 components used to assess the incidence of appendicitis in children. This PAS score was first made by Samuel in 2002. From the research conducted by Bhatt it was found that using PAS showed that a single cut-off-point (PAS 5) produced high false positives and false negatives. PAS performance increases when two cut-points are used. Using this strategy, the negative appendectomy rate is 4.4%.

From our research, 40 patients were sampled in the study. Patient characteristics can be seen in table1. From this table it is found that male patients (70%) outnumber females (30%), this is in accordance with research conducted by Stevenson and Edward in 2003 which stated that the incidence rate in boys was more frequent than in girls about 55% to 65% of patients. Research conducted by Marissa in 2012 also obtained similar results, which stated that Appendicitis was more common in men than women in a ratio of 3: 2. But slightly different from the results obtained by Richard et al in 2014, they stated that the incidence in men and women was generally comparable, except at the age of 20-30 years, the incidence of men was higher.

It is also known that the median value of patients who suffer is 11 years with a range of ages from 0 years to 18 years. The same thing was also stated by Marissa et al who stated that appendicitis occurs in the United States each year and especially occurs in children aged 6-10 years. Richard et al said that Appendicitis can be found at all ages, only in children less than one year are rarely reported. The highest incidence is in the age group of 20-30 years, after which it decreases.

From the results of our study it was found that the mean value of the RDW number is 12.95 (11.50-18.30). The results of a study conducted by Bozlu et al in 2016 also concluded that children with appendicitis had a higher RDW value than those who did not experience appendicitis. Research conducted by Tanrikulu in 2014 stated that RDW can be used as a diagnostic scale in appendicitis patients. Ertekin et al in 2017 conducted a similar study and found that RDW was found to be significantly more in patients with a diagnosis of appendicitis than in patients without this diagnosis. However, from a study conducted by Narci et al in 2013 it was concluded that RDW values were low in patients who had acute appendicitis.Another study conducted by Toktas in 2017 also said that the value of RDW decreased in patients with acute appendicitis, but requires further research to confirm this.

The results of our study also showed that the Pediatric Appendicitis Score (PAS) score was 4.50 (1-9). Research conducted by Sayed in 2017 states that PAS can be used as an indicator in excluding patients with appendicitis. When compared with research conducted by Goulder in 2008 it was stated that PAS could not yet be used as a recommendation indicator that leads to appendicitis.

We tried to see if there was an association between RDW and PAS in patients with appendicitis. By using the Spearman correlation, the results obtained in accordance with table 2 where the correlation coefficient (r) is 0.508, which means it has a moderate correlation, at the p-value the results obtained $p < 0.05$, which means statistically significant. So it can be said that between RDW and PAS have a significant correlation.

Conclusion

The conclusion we can draw from this study is that RDW and PAS can be used as indicators in patients with appendicitis. RDW and PAS values have a positive and statistically significant correlation.

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