THE UTILITY OF WHITE BLOOD CELL COUNTS IN DIFFERENTIAL DIAGNOSIS OF ACUTE RESPIRATORY TRACT INFECTIONS IN CHILDREN TREATED AT KENYATTA NATIONAL HOSPITAL

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DECLARATION

This dissertation is submitted as my original work and has neither been

published elsewhere nor presented for a degree in any other university.

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ABSTRACT

Background: Most upper respiratory tract infections (URTI's) in children have a viral cause, resolve spontaneously and in most cases do not require laboratory investigations for diagnosis. Acute lower respiratory tract infections (ALRI) may be viral, bacterial or of mixed etiologies. Diagnosis and management of acute respiratory infections (ARTs) in our set up can he made using clinical criteria or Kenyan Integrated Management of Childhood Illnesses (IMCI) protocols which are adapted from World Health Organisation (WI-TO) generic guidelines for IMCI. However, children with respiratory infections in hospital settings undergo many routine tests like White blood cell (WBC) counts and blood cultures. These laboratory tests account for a large proportion of the cost of treatment of ARIs. Clinicians use WBC counts to try and differentiate URTI from ALRI without any evidence, this and the cost of' the test form the main justification for this study.

Objectives: To determine the utility of WBC counts in diagnosis and management of Acute Respiratory Infections in children treated at Kenyatta National Hospital.

Methodology

A descriptive cross sectional study where children aged 3 months- 13 years were enrolled from both out patient and inpatient populations. A sample size of 272 children with a WHO clinical diagnosis of acute respiratory infections was used. The study population was classified into

• URTI and ALRI groups using WHO IMCI classification for acute respiratory infections of No Pneumonia (URTI) and Pneumonia (ALRI). After treating any emergencies those who met the inclusion criteria and gave consent were enrolled into the study, four

milliliters of blood was taken in EDTA vaccutainers and analyzed using the SELDYN 3200 electronic cell counter. Total

WBC counts, Neutrophil and lymphocyte percent were determined. For this study the following normal values were used and any value above the upper limit was considered raised for all age groups.

<l2rnonths-Total WBC 6.0-18.0xl0/mm3. Neutrophils 40-80%. Lymphocytes 25-40%

12-36 months-Total WBC 6.0-17.5x109/mm3 Neutrophils 35-75%. Lymphocyte 25-40%

37-60months- Total WBC 5.5-1 5x 1 09/mm'. Neutrophils 45-80%. Lymphocyte 25-40°

>60 months- Total WBC 4.5-13 .5x 1 09/mm3. Neutrophils 35-70%. Lymphocytes 25-40°/o

Results

Four hundred and eighty children with respiratory infections were examined. Of these. one hundred and sixty eight had upper respiratory tract infection (URi'l) and one hundred and thirty six of them were enrolled into the study. Two hundred and twelve had lower respiratory tract infection (ALRI) and one hundred and thirty six of them were enrolled.

The ratio of males to females was 1.2:1. Most of the children were <60 months of age with a median age of 8 months in the URTI group and 7 months in ALRI.

9 children <12 months had raised WBC counts while 3 children of the same age had low WBC count. In the 12-36 months age group 1 child had raised WBC counts and 17 had low counts. 3 children in the 37-60 months had raised WBC counts and 4 had low counts. The overall number of children with age specific abnormal WBC counts was 42 which wasl5% of the total study population (n=272). 22(52%) of these children with abnormal

WBC were in the ALRI group while 20(48%) were in the URTI group. 89 children had age specific abnormal Neutrophile count which was 32.7% of the total population (n272). There were more Children<12 months with abnormal Lymphocytes 85 (31.2) than in the other age groups. 35 were in the 12-36 month age group and 18 of them in the 37-60 months age group. 12 children >60 months had abnormal Lymphocytes. A total of 150 children had age specific abnormal lymphocytes. 103(68.7°/o) or them had raised lymphocytes. 59% of the children with raised WBC counts were in the URTI group.

As a diagnostic test for differentiating ALRI from URTI, WBC counts had sensitivity of 12% and specificity 14.7%. The test had a Positive predictive value of 52.4% and a Negative predictive value of 50.4%.

Conclusion

The proportion of children with age specific abnormal WBC counts was similar between the URTI group and the ALRI group. Our findings did not find WBC counts to be useful in differentiating between the two groups.

As a diagnostic test for differentiating ALRI from URTI. WBC count is of low sensitivity (12%) and specificity (14%).

Recommendation

Children with acute respiratory infections should not be subjected to routine WBC counts since 85% of them have normal age specific values making the test of no utility in diagnosis and management.