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Short Communication

Neutrophil to Lymphocyte Ratio an Indicator of Hepatitis B Vaccine Response in Haemodialysis Patients

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ABSTRACT

Neutrophil to Lymphocyte Ratio (NLR) is a new, cheap and sensitive and predictable test in many diseases especially if it be high but the lower level is also important. This study tries to show importance of NLR and immunity level following hepatitis B vaccination. 100 cases with ESRD received last dose of hepatitis b vaccine and their Complete blood count and NLR was recorded, their immunity level were assayed after six months, the relation of immunity response and NLR were analysed, NLR >3.58 is high and <0.8 is low. Data processed in SPSS 19 by Chi square and Mann Whitney U tests were used and p<0.05 was significant. 100 cases entered to study aged (year) between 27 and 86, mean±SD 62±14 years, NLR median (Minimum, Maximum) was 2.5 (0.56, 8.8), mean±SD of NLR was 2.7± 1.3, low NLR was seen in 4% and high in 16% of cases, there is not any relation between high NLR >3.58 and antibody response (titer above 10 IU/L) X^2 (1,93) p 0.7, there is strong relation between Low NLR<0.8 and non-response to antibody X^2 (1,80) p 0.03, likelihood ratio:6.9. Low NLR increases the risk of non-response to hepatitis B vaccination the lowest cut off level is less than 0.8 in our study. It is warranted to retest this theory on very high NLR and larger sample with regard that it was the first study in this field.

Keywords: Immunity, Vaccination, Neutrophil to lymphocyte ratio, Hemodialysis, Hepatitis B.

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INTRODUCTION

There are over 20 years that the index of the Neutrophil-to–Lymphocyte Ratio (NLR) is considered as the most simple, appropriate and sensitive test for many purposes that show intensity and prognosis of many immune and inflammatory conditions, this ratio referred as Neutrophil/Lymphocyte Stress Factor (NLSF) by some that show two principles immunocompetent leukocyte populations, i.e, neutrophil granulocytes and lymphocytes.[1] The normal ratio of NLR in normal population are between 0.7 and 3.58. In spite of high NLR in most articles considered as poor prognosis but low NLR may be seen as a prognostic factor in some conditions that was not explained clearly such as low NLR as a multidrug resistance pneumonia prediction.[2] in this report we want to find the NLR values in adult dialysis patients and find relation of antibody response to hepatitis B six months after vaccination based on pre-vaccination NLR. We sure this help clinician to adjust or design new plan for vaccination efficacy in special groups such as immune-deficient patients.

METHODOLOGY

Hundred cases with ESRD under dialysis entered to this study, they received their last dose of hepatitis B vaccine, their complete blood count was obtained and NLR calculated, levels above 3.58 and under 0.8 were considered as high and low, cases with active infection history in 2 weeks earlier, autoimmune disease and cancer were excluded, after 6 months their hepatitis B antibody level was measured.

Statistical Analysis of Data

Data was expressed by mean, median, standard deviation and they processed in SPSS 19 and analysis was done based on non-parametric data, Chi Square and Mann Whitney U tests were used and p<0.05 was significant.

RESULTS

Hundred cases recruited to study, with age (years) between 27 and 86 Mean±SD 62±14 years. Their distribution of NLR was non-parametric, median (Minimum, Maximum), 2.5 (0.56, 8.8), mean±SD of NLR was 2.7±1.3. Low NLR was seen in 4% and high in 16% of cases. There is not any relation between high NLR (3.58) and antibody response (titer above 10 IU/L) X^2 (1,93) p 0.7. There is relation between low NLR (0.8) and non-response to antibody X^2 (1,80) p 0.03 with likelihood ratio 6:9.

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DISCUSSION

NLR is a marker of relation between innate (neutrophils) and adaptive cellular immune response (lymphocytes), stress conditions. Age, race, medication, chronic disease like coronary heart disease, stroke, diabetes, obesity, psychiatric diagnosis, cancer of solid organs, anemia and stress can effect on NLR. There are different references for normal range of NLR but generally values 1-2 is normal and higher than 3.0 and below 0.7 in adults are pathological. NLR, 2.3-3.0 is grey zone and may serve as early warning of pathological state. In serious inflammation, NLR rises may be dramatically higher than 30, NLR is a sensitive, cheap marker and valid indicator of prognosis of many clinical events especially if be investigated daily in critical illness.[1] The rule of increased NLR and poor prognosis is not always true, for example in cases with infiltrating tumours values lower than 1.59 to1.94 may be associated with poor prognostic related to the different length of living of neutrophils and lymphocytes, neutrophil counts reduces in shorter time while circulating lymphocytes persist.[3] in other study, lower NLR level was identified as a clinical predictor of Multi Drug Resistant (MDR) infection as acquired Hospital Pneumonia (HAP). This study show lower NLR (mean 7 vs 10) was associated with multi resistent drug pneumonia.[2] Other study shows severe neutropenia that may be a reason for lower NLR ratio, is associated with compromised effectiveness and increased rate of complications after immunization. The authors believe, phagocytic cells defects, or explicitly neutropenia can halt successful immunization. They believe that there are no contraindications for inactivated vaccines in neutropenia, but live bacterial vaccines are contraindicated. While in general the vaccination with live viral vaccines is encouraged, occasionally neutropenia might be associated with defects of adaptive immunity, which would preclude the administration of such vaccines.[4] In End-Stage Renal Disease (ESRD), NLR is a marker for inflammation and values NLR >6.53 are significantly associated with complication but many other factors can effect on NLR such as hormonal changes, hypovolemic condition, hematological disease or infections and steroid use.[5,6] neutropenia as a component of NLR in hemodialysis is occurred in pulmonary sequestration of neutrophils after complement activation by the dialyzer membrane. Increased expression of neutrophil adhesion receptors, such as CD11b/CD18, suggests that neutrophil adhesion to the capillary endothelium is a possible mechanism.[7] On other side, results suggest that uremic toxin make neutrophils undergo accelerated apoptosis.[8] Nutritional deficiencies of vitamin B12, folic acid or copper, or severe protein-calorie malnutrition can cause neutropenia. These deficiencies almost always cause multiple cytopenia rather than isolated neutropenia[9] but iron deficiency anemia is a well-known cause of neutropenia that is reversible after iron therapy.[10]

Our results show median and mean of NLR in ESRD under dialysis in our study is higher than general population. The mean±SD of NLR is 2.7±1.3 and Median (Minimum, Maximum) is 2.5 (0.56, 8.8). There is a significant relation between low NLR and immunity level following hepatitis B, 6 months post immunization. Low NLR may be related to relative neutropenia in some patients under dialysis or because of uremia, malnutrition or haematological especially iron deficiency anemia. In fact, this study cannot predict immunity level after vaccination in very high level of NLR More above than we met(Maximum 8.8) in our limited small sample size in ESRD. This study is the first that tried to find relation of NLR ratio before vaccination and immunity level after 6 months in selected cases in limited sample and we hope it be the first step for other comprehensive trials.

CONCLUSION

Low NLR in patients under hemodialysis can be predictable for lower immunity level to hepatitis B vaccine. This theory should be followed in less bias studies by cohort method in other vaccine types with control groups.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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