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Original Research Article

Relationship Between Neutophil-Lymphocyte Ratio (NLR) in Deliberate Self-Harm

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Abstract:

Background: One of the main predictors of suicide and a significant public health issue is deliberate self-harm (DSH). A straightforward biomarker of systemic inflammation, the NLR, which is obtained from regular blood counts, has been linked to psychiatric illnesses and inflammatory processes. The purpose of this study was to evaluate the association between NLR and deliberate self-harm in hospitalized patients.

Methods: A cross-sectional observational study was conducted at Rajarajeswari Medical College & Hospital, Bengaluru, over 12 months. Seventy patients admitted with deliberate self-harm were included. Clinical and demographic data were recorded, and psychiatric assessment was carried out. Venous blood samples were analyzed for complete blood counts, and NLR was calculated. A statistical analysis was conducted to assess correlations between NLR, frequency of self-harm attempts, and severity of suicidal intent.

Results: The mean age of the participants was 27.8 ± 6.4 years, with 58.6% females. The mean NLR among patients with deliberate self-harm was 3.72 ± 1.21, significantly higher than the standard reference mean of 2.1. Patients with repeated attempts had higher mean NLR values (4.25 ± 1.09) compared to first-time attempters (3.41 ± 1.07), which was statistically significant. Suicidal intent severity scores showed a positive connection with NLR.

Conclusion: Elevated NLR is significantly associated with deliberate self-harm, particularly among patients with repeated attempts and greater suicidal intent. As a cost-effective and easily accessible biomarker, NLR may serve as a useful adjunct in the early identification of high-risk individuals and in guiding timely psychiatric interventions.

Keywords: Neutrophil-Lymphocyte Ratio, Deliberate Self-Harm, Suicide Risk, Inflammation, Biomarker.

Introduction

Deliberate self-harm (DSH) has become an important clinical and social concern, recognized as a strong predictor of future suicide. It includes a range of behaviors such as ingestion of poisonous substances, drug overdose, and self-inflicted injuries [1.2]. The act is often associated with psychiatric illnesses, particularly depression, anxiety disorders, and personality disorders, although it can also occur in the absence of a formal diagnosis. In India, where mental health resources remain scarce and stigma is widespread, the problem is particularly pressing among young adults and women, placing a heavy burden on health care systems [3]. Early identification of individuals at risk is therefore a crucial step in prevention strategies.

Growing evidence highlights the role of inflammation in the development of psychiatric disorders and suicidal behaviors [4]. Patients with depression and suicidal thoughts have been shown to have elevated levels of inflammatory markers, such as IL-6, tumor necrosis factor-alpha, and CRP. The neutrophil-lymphocyte ratio (NLR), one of the readily available markers that may be obtained from normal blood counts, has gained interest as a straightforward and affordable way to measure systemic inflammation. Elevated NLR values suggest both an increase in innate immune activation and a reduction in adaptive immune response [5,6]. Several studies have reported higher NLR values in individuals with mood disorders and those who have attempted suicide, indicating a possible link between immune changes and self-harming behavior [7].

Despite these observations, research focusing specifically on NLR in cases of deliberate self-harm is still limited, especially in developing countries. Most available studies have been conducted in Western populations, and data from India remain scarce. Considering that DSH is frequently

encountered in emergency and psychiatric services, the availability of an objective, inexpensive marker such as NLR could assist clinicians in identifying individuals at greater risk of repetition or severe intent. Therefore, the goal of the current study was to investigate the relationship between NLR and intentional self-harm in patients who were hospitalized to a Bengaluru tertiary care hospital, and to examine whether elevated NLR values correlate with repeat episodes and the severity of suicidal intent.

Methods

Study Design and Setting: A cross-sectional study was carried out in Bengaluru at Rajarajeswari Medical College & Hospital over 12 months, an observational.

Study Population: A total of 70 patients aged ≥ 18 years admitted with deliberate self-harm were included. Inclusion criteria comprised patients presenting with any self-inflicted act (ingestion of poisonous substances, medication overdose, or physical injury) requiring medical attention. Exclusion criteria included active infection, chronic inflammatory or autoimmune disease, and the use of corticosteroids or immunosuppressants. Written informed consent was obtained from all participants.

Data Collection: Clinical and sociodemographic details (age, sex, education, marital status, psychiatric history, and method of self-harm) were documented. Psychiatric evaluation employed the MINI diagnostic interview based on DSM-5 criteria. Suicidal intent was assessed using Beck's Suicide Intent Scale (BSIS).

Laboratory Analysis: Approximately 5 ml of venous blood was drawn on admission for complete blood count analysis using an automated hematology analyzer. The NLR was calculated as the ratio of absolute neutrophil count to absolute lymphocyte count.

Statistical Analysis: The mean ± SD was used to express continuous variables. SPSS software was used to examine the data. Comparisons between groups (first-time vs. repeat attempters) were made using independent sample t-tests. Correlation between NLR and suicidal intent using Pearson's correlation coefficient, scores were examined. Statistics were considered significant when P-values were less than 0.05.

Results

Participant Characteristics: The study included 70 participants, with a mean age of 27.8 ± 6.4 years; 58.6% were females. The most common methods of self-harm were ingestion of poisonous substances (47.1%), medication overdose (31.4%), and self-inflicted physical injury (21.5%).

Table 1: The study population's clinical and demographic features

Variable	Value
Age (years)	27.8 ± 6.4
Female (%)	58.60%
Mean NLR (overall)	3.72 ± 1.21
Mean NLR (first-time)	3.41 ± 1.07
Mean NLR (repeat)	4.25 ± 1.09
Suicidal Intent Score	Correlation r=0.42, p=0.001

Table 2: Comparison of NLR between first-time and repeat deliberate self-harm attempters

Group	Sample size (n)	Mean NLR ± SD	p-value
First-time attempters	42	3.41 ± 1.07	0.02
Repeat attempters	28	4.25 ± 1.09	

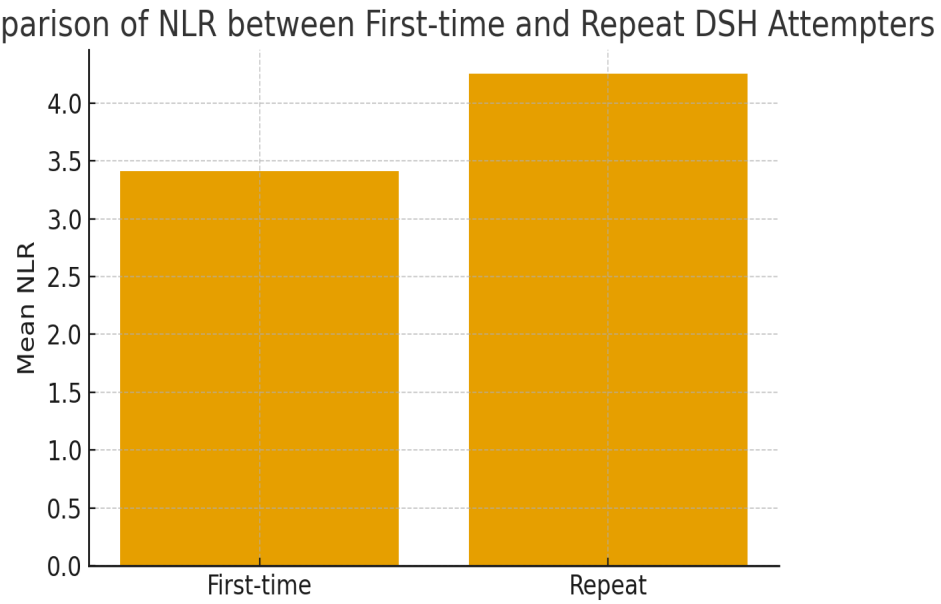

Figure 1: Mean NLR values among first-time and repeat deliberate self-harm attempters

NLR Findings

- The mean NLR among DSH patients was 3.72 ± 1.21, significantly higher than the normal reference mean of 2.1.
- Patients with repeated self-harm attempts demonstrated a significantly higher mean NLR (4.25 ± 1.09) compared to first-time attempters (3.41 ± 1.07).
- A positive correlation was observed between NLR values and suicidal intent severity scores ($r = 0.42$, $p = 0.001$).

Discussion

This study looked at the relationship between NLR and DSH in a group of patients who were hospitalized to a Bengaluru tertiary care facility. The findings showed that NLR values were higher in individuals with self-harm compared to standard reference levels. In addition, patients with repeated self-harm episodes had significantly higher NLR values than first-time attempters, and there was a positive correlation between NLR and suicidal intent. These results suggest that systemic inflammation, reflected through elevated NLR, may be linked to both the occurrence and severity of self-harming behavior.

The role of inflammation in psychiatric disorders has been widely studied in recent years. Elevated levels of markers such as IL-6, tumor necrosis factor-alpha, and C-reactive protein have been reported in individuals with bipolar disorder, depression, and suicidal ideation [8,9]. NLR, calculated from routine blood counts, provides a convenient and inexpensive measure of inflammatory activity. The higher NLR values in our study population support earlier findings from international research and point toward immune dysregulation as a possible biological mechanism underlying self-harm [10].

The difference in NLR between first-time and repeat attempters is particularly important. Repeated self-harm is generally associated with more severe psychopathology, higher risk of suicide, and greater psychosocial stress [11,12]. The finding that NLR was higher in this group suggests that sustained or recurrent inflammatory changes may contribute to chronic risk. Similarly, the association between NLR and suicidal intent scores reinforces the potential clinical value of this marker, indicating that it may help identify not just individuals at risk, but also those with more severe or dangerous self-harm behavior [13].

Several biological explanations may account for this link. Inflammatory processes can disrupt neurotransmitter function, including serotonergic and dopaminergic pathways, both of which are closely tied to mood regulation and impulsivity [14]. Pro-inflammatory cytokines may also alter neuroplasticity, activate the hypothalamic-pituitary-adrenal axis, and increase stress sensitivity. Together, these mechanisms may promote emotional instability, hopelessness, and impaired coping—factors often present in people who harm themselves [15]. NLR, as a simple and routinely available parameter, may therefore serve as an indirect indicator of these pathophysiological changes.

The practical implications of these findings are considerable. In emergency settings, particularly in low-resource regions, detailed psychiatric assessments may not always be possible at the time of admission [16]. A simple biomarker like NLR

could provide additional support in identifying patients who need urgent psychiatric attention. Although it should not be used in isolation, NLR could complement existing clinical and psychosocial evaluations, guiding early intervention and closer monitoring [17,18]. Its low cost and availability also make it especially relevant in settings where specialized mental health services remain limited.

However, this study has limitations. The findings' generalizability is limited by the single-center methodology and somewhat small sample size. Because of the cross-sectional design, it is not possible to determine whether elevated NLR is a cause or consequence of self-harm. Other factors such as subclinical infection, lifestyle habits, or comorbid medical conditions may also have influenced the values. Future research should therefore include larger multicenter cohorts, employ longitudinal designs, and examine additional inflammatory markers alongside NLR. Integrating biological data with psychiatric assessments may ultimately help build more accurate models for predicting risk and preventing self-harm.

Conclusion

Elevated NLR was significantly associated with deliberate self-harm, particularly among patients with repeated attempts and higher suicidal intent. Given its availability and cost-effectiveness, NLR may serve as a valuable adjunctive biomarker for risk stratification in emergency and psychiatric settings. Larger, multicentric studies are recommended to further validate these findings and explore their predictive utility.

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