

NEUTROPHILIC LEUKOCYTOSIS IN NONFATAL SUICIDAL HANGING: A CASE SERIES

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received: 23.7.2020;

revised: 20.8.2020;

accepted: 28.8.2020

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INTRODUCTION

Suicide along with other forms of suicidal behavior (SB) is a preventable public health problem (World Health Organization 2014). SB is the end product of the complex interaction of diverse factors (Brundin et al. 2017). Although multiple risk factors have been identified precise estimation of risk has not been possible and a clear explanation of the neurobiology of SB is still lacking (Gibbs et al. 2016). A possible link with immune response has been postulated from clinical as well as epidemiological observations (Brundin et al. 2017). Thus, the identification of biomarkers of SB could be a potential option to estimate the risk precisely as well as to consider clinical steps to prevent suicides (Ganança et al. 2016). An accumulating body of evidence indicates that neuroinflammation plays a critical role in the pathobiology of suicidal behaviors (Mina et al. 2015). Increased neutrophil-lymphocyte ratio (NLR) has been suggested as a marker of low-grade systemic inflammation in psychiatric disorders and limited evidence points to increased NLR among suicide attempters with and without psychiatric morbidity compared to control group (Çakır et al. 2015). NLR is a convenient and cost-effective investigation compared to inflammatory markers and it may be relevant to investigate its utility further. We present a series of 4 cases of attempted suicide, both with and without psychiatric morbidity. In all of them, the NLR was elevated.

CASES

Case 1:

Mrs. S, a 35-year-old lady was admitted after rescuing from hanging and transferred to psychiatry after completing the assessment by detailed history, physical examination, and laboratory investigations (routine as well as neuroimaging i.e. MRI of the brain). Her mental state examination (MSE) revealed

an impulsive attempt after a quarrel with her husband without any psychiatric co-morbidity. Her complete blood count (CBC) revealed a WBC count of 24700/ μ L whilst neutrophil count was 84% and lymphocyte count was 12% without any overt evidence of infection (Table 1).

Case 2

Mrs. D, a 23-year-old married housewife was referred to psychiatry after a failed attempt to hang herself after a quarrel with her husband. Her MSE revealed an impulsive attempt without any psychiatric co-morbidity. Again, her WBC count was 22990/ μ L whilst neutrophil count was 94% and lymphocyte count was 4% without any overt evidence of infection (Table 1).

Case 3

Mr. F, a 40-year-old married male was referred to psychiatry for psychiatric evaluation after a failed attempt of hanging. He is a smoker and recently he has life events i.e. financial loss. His MSE revealed that he has been suffering from a depressive disorder. His all available reports were within the normal range except the WBC count was 18230/ μ L whilst neutrophil was 82% and lymphocyte was 14% without any other evidence of infection (Table 1).

Case 4

Mrs. Z, a 35-year-old married housewife was rescued by her husband while she attempted suicide. Her MSE revealed nothing significant regarding mental illness and all available reports were within the normal range except the CBC. The WBC count was 16120/ μ L whilst neutrophil was 92% and lymphocyte was 6% without any other evidence of infection (Table 1).

This series was reported by complying with the declaration of Helsinki 1995 (as revised in Edinburgh 2000). The cases were reported anonymously and informed consent was taken to publish their anonymous information. No formal institutional review board permission was taken for reporting the series.

Table 1. Demography and blood counts of the cases

Variable	Case 1	Case 2	Case 3	Case 4
Age in year	35	23	40	35
Sex	Female	Female	Male	Female
Education	Grade 5	Grade 10	Grade 5	Grade 10
Occupation	House wife	House wife	Day laborer	House wife
Marital status	Married	Married	Married	Married
Smoking	No	No	Yes	No
Psychiatric comorbidity			Depression	
Physical comorbidity	No	No	No	No
Mode of attempt	Hanging	Hanging	Hanging	Hanging
Previous Attempt		Cut injury		
Risk factor	Marital discord	Marital discord	Marital discord	Marital discord
Amnesia	Retrograde	Retrograde	Retrograde	Retrograde
Total WBC count (/μL)	24700	22990	18230	16120
Neutrophil (%)	84	94	82	92
Lymphocyte (%)	12	4	14	6

DISCUSSION

Pieces of evidence have been coming out searching the biomarkers of suicides and few markers have been identified such as NLR, CRP, raised levels of serum tumor necrosis factor-alpha (TNFa) and interleukin-6 (IL-6) (Gibbs et al. 2016, Brundin et al. 2017, Ganança et al. 2016). The age of the suicide attempters ranged from 23 to 40 years. All the cases included in this report attempted suicide by hanging. None of the suicide attempters had a history of physical co-morbidity or any medical cause that could explain inflammation. Only one case had a history of depression and tobacco use in the form of smoking. All the cases had a similar pattern of hematological change (neutrophilic – leukocytosis). One study revealed that NLR as a potential biomarker of suicidality in patients with major depressive disorder (Age=43.87±14.36, n=538) and recommended that the NLR-may determine suicide risk in patients with depression (Velasco et al. 2020). Another study found that among 27 suicide patients and 26 major depression groups, NLR was higher among the patients who had suicide attempts (Gundogdu Meydaneri & Meydaneri 2018).

There could be at least three reasons for observed neutrophilia in the described cases– psychological stress, systemic inflammation, and tissue damage due to hanging. It will be interesting to see, whether the inflammatory changes are a transient or sustained phenomenon. Subsequent research should also consider the serial monitoring of inflammatory markers from the time of hanging, which will give insight into the impact of hypoxia in triggering the inflammatory changes. Similarly, a comparison of inflammatory markers among suicide attempters with various modes of suicide will also provide important information related to suicide mode-specific inflammatory changes. Recently, NLR studied to differentiate from violent, non-violent, and healthy control (n=38, each group) where NLR was found to be significantly higher in the violent suicide group (Orum et al. 2018).

Although it is difficult to make sweeping generalizations from our report, these findings indicate that systemic inflammation may be relevant among suicide attempters without psychiatric morbidity. This opens up a few questions for future research – are there differences in levels of inflammation between attempters with and without psychiatric morbidity? Are the inflammatory processes qualitatively different between these groups? Do anti-inflammatory treatments have a role in the group without psychiatric morbidity? There may also be merit in profiling the two groups of attempters in terms of immunological biomarkers to assist suicide risk assessment and prevention.

The CBC was done and assessed cross-sectionally. Follow up investigations could reveal different scenarios and any change over time could be assessed. We did not consider the bodyweight in the analysis which is a known factor to affect the neutrophils and related ratio.

CONCLUSIONS

Immuno-biological changes do play a role in psychiatric disorders. There is a need of doing intense research to understand the immune-biology of suicidal behavior. It is important to understand the hematological changes from the perspective of etiology and /or sequel of suicidal behavior.

Acknowledgments: None.

Conflict of interest: None to declare.

Contribution of individual authors:

S.M. Yasir Arafat: Idea, concept, design, writing, review and final approval.

Sujita Kumar Kar: Concept, review and final approval.

Vikas Menon: Writing, review and final approval.

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