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Investigation of the relationship between neutrophil-to-lymphocyte ratio and obstructive sleep apnoea syndrome

Dear Editors,

I came across a very interesting article published in your esteemed journal titled 'Investigation of the relationship between neutrophil-to-lymphocyte ratio and obstructive sleep apnoea syndrome' by Yenigun *et al*.[1] The article is well written and I appreciate the effort put in by the authors. However, I am concerned about the authors' conclusion and would like to express the same through your prestigious journal.

The increase in inflammatory markers and its effect on cardiovascular morbidity in obstructive sleep apnoea[2] has been known for quite some time. Neutrophil-to-lymphocyte ratio presents an exciting option for monitoring obstructive sleep apnoea patients because it is very simple to determine, and is not uncomfortable and cumbersome like polysomnography. However, a word of caution is advised, for multiple reasons.

Firstly, neutrophil-to-lymphocyte ratio varies with patient age and body mass index,[3] and will therefore vary from person to person. There are no standard cut-off values for neutrophil-to-lymphocyte ratio to determine whether it is abnormal or not. Without such standardisation, it is difficult to determine the significance of neutrophil-to-lymphocyte ratio in these patients.

Secondly, although abnormal neutrophil-to-lymphocyte ratio in obstructive sleep apnoea has been proven in previous studies,[4] there are many other common conditions, such as Bell's palsy[5] and even chronic tonsillitis,[6] where the values of neutrophil-to-lymphocyte ratio can be deranged. As the neutrophil-to-lymphocyte ratio can be influenced by so many common conditions, its specificity for use as a diagnostic tool comes into doubt.

Thirdly, although the authors have concluded that neutrophil-to-lymphocyte ratio correlates with the severity of obstructive sleep apnoea, it is not clear whether this relationship is linear or not. Only if the relationship is linear can it be used as a diagnostic tool for determining the severity of obstructive sleep apnoea. Another point which could have been evaluated is whether the neutrophil-to-lymphocyte ratio also depends on the duration of obstructive sleep apnoea and other co-morbid factors such as hypothyroidism. This can be done in future prospective trials.

I would like to conclude by stating that we still have a long way to go before we can truly analyse the significance of neutrophil-to-lymphocyte ratio in obstructive sleep apnoea.

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Authors' reply

Dear Editors,

Neutrophil-to-lymphocyte ratio varies with patient age and body mass index.[1] Therefore, in our study, there was no difference between the body mass indices and mean ages of the groups ($p = 0.20$ and $p = 0.415$ respectively). The neutrophil-to-lymphocyte ratio is now accepted as a significant predictor of adverse clinical outcomes, and various studies have found neutrophil-to-lymphocyte ratio to be a reliable biomarker in oncology,[2,3] cardiology,[4,5] and several other diseases accompanied by systemic inflammation such as Alzheimer's disease, ulcerative colitis, appendicitis and chronic kidney disease.[6–9] The standard cut-off value of neutrophil-to-lymphocyte ratio was not stated in these studies either. These studies compared the groups as we did in our study. The cut-off values of neutrophils and lymphocytes are known. A meta-analysis of the studies covering neutrophil-to-lymphocyte ratio would need to be conducted to define a standard cut-off value of neutrophil-to-lymphocyte ratio.

Neutrophil-to-lymphocyte ratio has started to be used in systemic inflammatory diseases, including those that implicate interleukin (IL)-6, IL-10, IL-1α, tumour necrosis factor-α and other inflammatory cytokines.[10–12] Moreover, it may show variability in inflammatory conditions, as do other cytokines. For this reason, more studies have been conducted in recent years examining the association of neutrophil-to-lymphocyte ratio with inflammation.[1–9]

The results of our study demonstrated that the neutrophil-to-lymphocyte ratio values had a positive correlation with the severity of obstructive sleep apnoea syndrome (OSAS). The neutrophil values increased ($p = 0.009$) and lymphocyte values decreased ($p = 0.0005$) as OSAS severity increased. Hence, the neutrophil-to-lymphocyte ratio values increased linearly compared to OSAS severity ($p = 0.0008$). The results of our study suggested that the neutrophil-to-

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lymphocyte ratio, which increases as a consequence of systemic inflammatory response in OSAS, will be significant in the clinical follow up of OSAS patients. We advocate performing the neutrophil-to-lymphocyte ratio as an auxiliary diagnostic method in all patients. However, we do not think this measure could replace polysomnography. A polysomnographic evaluation is required for the diagnosis of OSAS. Polysomnography is also used to decide whether continuous positive airway pressure (CPAP) is required, and for planning the CPAP treatment protocol.

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