To Reviewer #2:

Thanks for your keen review. The manuscript was revised according to your comments and highlighted in BLUE.

Q 1: English editing

R 1: Thanks for your suggestions. We have reflected on the content of the article and revised the English expressions in the article (line 36-39, 41-42, 62-66).

Q 2: The introduction must be rewritten and expanded. More literature on the anti-inflammatory effect of these compounds should be included and discussed.

R 2: In the introduction, we review the researches about anti-inflammatory activity of fucoidan in recent years, and discuss in the article (line 64-66).

Q 3: Explain why all the analyses were carried out only on the third fraction of the polysaccharide extract.

R 3: According to NO inhibition experiment, the inhibitory effect of LJNF3 on NO was significantly higher than that of LJNF1 and LJNF2 which indicated that LJNF3 showed superior anti-inflammatory activity. This problem was also mentioned of the first reviewer, which has been marked in red in the article (line 168-171).

Q 4: Most of the figures are of low quality, at the limit of readability. Please fix them.

R 4: Thanks for your keen comments. Due to the requirement of the journal, there is no need to upload the figures separately when using its template, and displaying the figures directly in Word may reduce the pixel of the figures. We guarantee that all the images are vector images and they can achieve the clarity required by the journal. Besides we can provide figures files separately if necessary.

Q 5: Please explain the statistical results of the Tukey's (and not Turkey's, correct it) post-test. Specify the meaning of each letter, it is not clear.

R 5: Thanks for your keen review and we have made a supplement in the article (line 195-196, 224-225, 248-249, 292-293, 308-309, 338).

Q 6: As regards the ELISA, please report the results as concentration, and not as a percentage of variation.

R 6: Thanks for your keen review. By retrieving, it found that using ELISA kits measured results can be expressed with concentration and also can be expressed as a percentage (doi:10.3390/md18120601, https://doi.org/10.1186/s41240-019-0121-8, https://doi.org/10.1016/j.algal.2019.101513, https://doi.org/10.1016/j.ijbiomac.2019.03.105). In this study, we discussed the LJNF3 against pro-inflammatory cytokines inhibition of inflammation model induced by LPS as positive control group. The statistics in the form of percentage can more intuitively reflect that LJNF3 has a dose-dependent inhibition of the secretion of inflammatory cytokines.

Q 7: Also, comparing the results found in the previous paper (Ni 2020), why the fractions obtained from the same species of seaweed are different? Please, explain

R 7: In the experiment, we collected the *Saccharina japonica* cultured in Rongcheng in the north and Fujian in the south respectively, and studied the fucoidan obtained from their separation. It was found that the fucoidan in *Saccharina japonica* would be affected by the geographical problem.