We need a Prediction Interval to evaluate the heterogeneity of meta-analyses

Dear Editor,

We read with interest the meta-analysis by Hamad et al (1) on the incidence and risk factors of venous thromboembolism in patients with lateral amyotrophic sclerosis, published in the October issue of "La Tunisie Médicale" (1), and congratulate the authors. However, we have a few comments concerning the methodology, which is not complete:

1) The inclusion in a meta-analysis of retrospective studies, even if longitudinal, and prospective studies to determine the incidence of venous thromboembolic disease introduces a significant bias. Retrospective longitudinal studies have limitations in determining the incidence of the disease. Retrospective studies are subject to selection and bias, missing data, and difficulties in establishing cause-and-effect relationships (2). Indeed, the patient population of retrospective studies is larger than that of prospective studies, which could bias the results of the meta-analysis and compromise the validity of its conclusions on incidence. Reliability would be improved by focusing on prospective studies to obtain accurate estimates of incidence. The term prevalence is more appropriate for the design of this meta-analysis.

2) In addition, the authors applied the Cochrane test to examine heterogeneity, and inconsistency was quantified using the I^2 value. It should be noted that the accuracy of this concept is debatable, as Hamad et al provided no reference to support this method of assessing heterogeneity. However, Higgins (3) has reported this approach, which is considered expert opinion (level 5 evidence according to the Oxford classification). Borenstein, Higgins et al. addressed this method of heterogeneity assessment in another publication in 2017, entitled "I^2 is not an absolute measure of heterogeneity" (4). They (4), Dziri (5,6), and Borenstein (7) recommend assessing heterogeneity using the 95% prediction interval (PI) and its corresponding variance, Tau squared (Tau^2). The PI assesses the extent of variation in the true effect size.

3) We recalculated the forest plot (figure 1) using the comprehensive meta-analysis software version 4. We found the same mean effect size of 3% with a confidence interval (2.2% to 3.9%) and a 95% prediction interval (1.3% to 6.7%). Consequently, we can conclude that there is trivial heterogeneity that was not reported by Hamad et al. This conclusion provides a complete methodology.

In conclusion, although the meta-analysis by Hamad et al. provides insightful information, the reliability of its conclusions may be compromised by the use of retrospective data for incidence estimation and the chosen heterogeneity evaluation method. This study's robustness could be increased by using PI metrics to perform correctly a heterogeneity evaluation method as illustrated in figure 1.

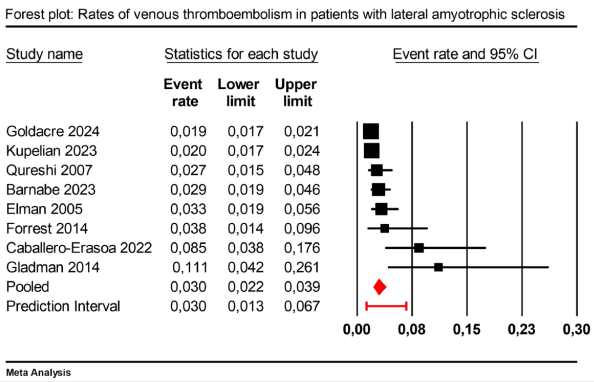

Figure 1. Forest Plot of included studies to determine the incidence of Venous Thromboembolism in patients with Lateral Amyotrophic Sclerosis

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References

1. Hamad AA, Alkhawaldeh IM, Abbas A, Elaraby A, Meshref M. Incidence and risk factors of venous thromboembolism in patients with amyotrophic lateral sclerosis: a systematic review and meta-analysis. La Tunisie medicale. 2024;102(10):610–515.
2. Talari K, Goyal M. Retrospective studies - utility and caveats. J R Coll Physicians Edinb. 2020 Dec;50(4):398–402.
3. Higgins JPT, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analyses. BMJ. 2003 Sep 6;327(7414):557–60.
4. Borenstein M, Higgins JPT, Hedges LV, Rothstein HR. Basics of meta-analysis: I^2 is not an absolute measure of heterogeneity. Res Synth Methods. 2017 Mar;8(1):5–18.
5. Dziri C. Evaluation of heterogeneity in meta-analysis. Colorectal Dis. 2023 May;25(5):1037-1038. doi: 10.1111/codi.16473. Epub 2023 Jan 19. PMID: 36626069.
6. Dziri C. How to assess heterogeneity for a meta-analysis? Tunis Med. 2022 Mai;100(5):353. PMID: 36206082; PMCID: PMC9552239.
7. Borenstein M, Hedges LV, Higgins JPT, RothsteinHR. Introduction to meta-analysis, second edition, Prediction Intervals (chapter 17) - Oxford, John Wiley & Sons Ltd 2021: 119-125

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