



META-ANALYSIS

**META-ANALYSIS ON METHYLENE BLUE FOR
SENTINEL LYMPH NODE DETECTION IN
BREAST CANCER**

Meta-Analysis on Methylene Blue for Sentinel Lymph Node Detection in Breast Cancer

Overview

At Statswork, we use our expertise in meta-analysis to provide more comprehensive and evidence-based literature access into medical research. In this example, we systematically reviewed and conducted a meta-analysis on comparison effectiveness of **Methylene Blue dye to other dyes** in sentinel lymph node (SLN) detection for breast cancer patients. Our meta-analysis employed strict methodology to evaluate clinical outcomes such as accuracy rate, detection rates, local inflammation or irritation with dye, and blue tattoo.

Study Objective

The key objective of this systematic review and meta-analysis was to compare the diagnostic performance and safety profile of Methylene Blue dye to other dyes should it be used in sentinel lymph node detection in breast cancer. A total of **32 patients** were included into the study. Among the total meta-analysis population, **28 were Methylene blue dye** and **28 was other dye**.

Methodology

- A systematic search of the literature and selection of eligible studies.
- Quantitative modeling with the use of **Forest and Funnel plots**.
- We anticipate calculating pooled **Risk Ratios (RR)** and **Confidence Intervals (CI)**.
- Assessment of heterogeneity and publication bias.
- To evaluate statistical significance, we will conduct a meta-regression.

Results Summary

1. Accuracy Rates Compared

- Risk Ratio (RR) - The risk ratio was calculated at 1.07, meaning there is a very low increase in risk, but a 95% confidence interval (0.91 to 1.25) demonstrates that this is likely not clinically meaningful.
- Z-Value - $Z = 0.78$ ($p = 0.44$)
- There were no statistically significant differences for individual diagnostic accuracy between Methylene Blue and other dyes.

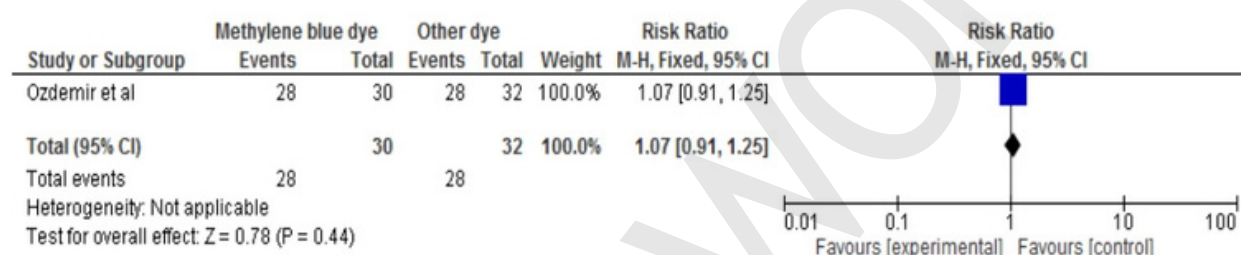


Figure 1: Forest plot showing accuracy rate comparison between Methylene Blue and other dyes.

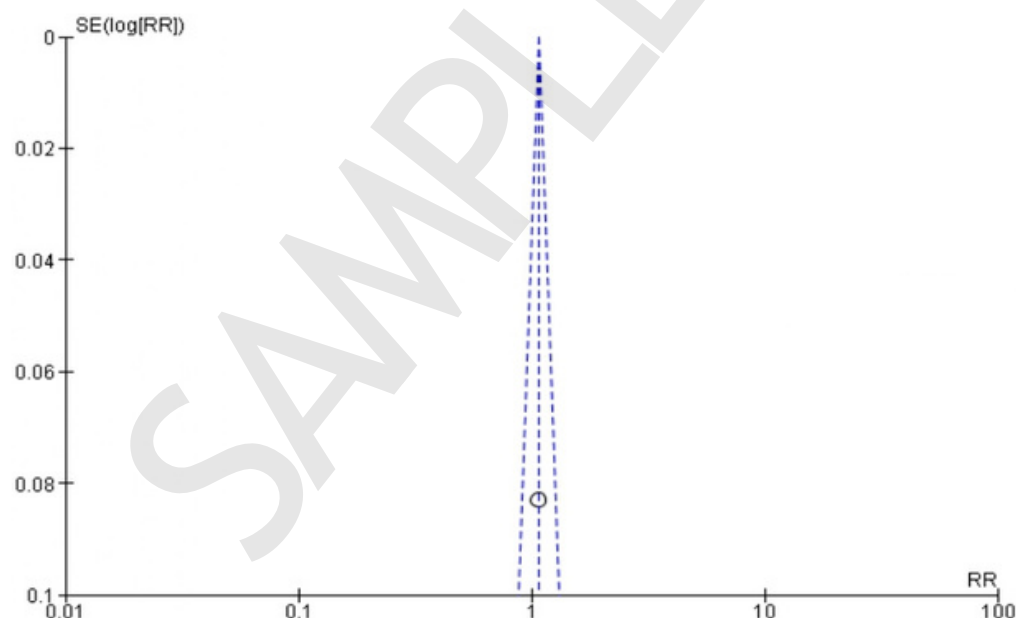


Figure 2: Funnel plot indicating publication bias in accuracy rate studies.

2. Comparison of Detection Rate

- Risk Ratio (RR): 0.97 (95% CI: 0.74 to 1.28)
- Z-Value: 0.18 ($p = 0.85$)
- There was not a statistically significant difference in detection rates.

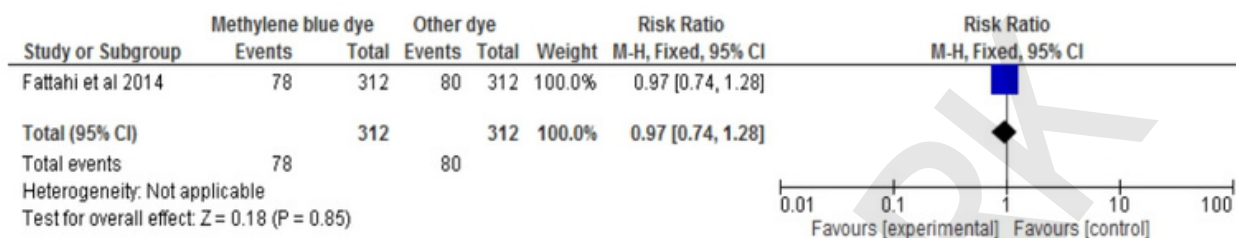


Figure 3: Forest plot showing detection rate comparison.

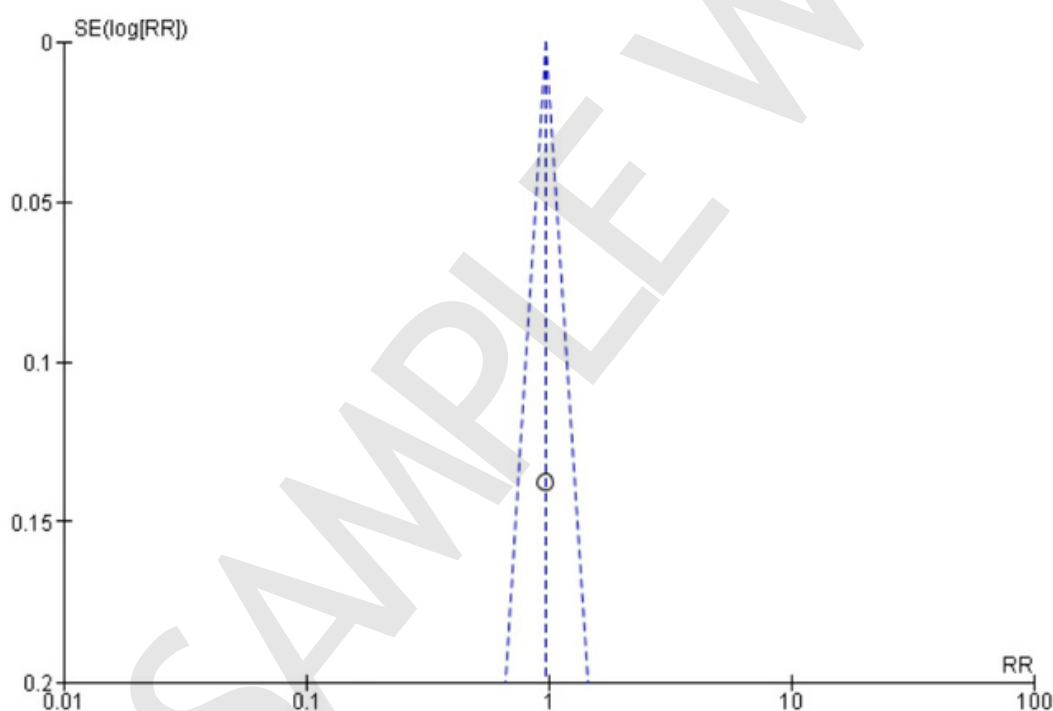


Figure 4: Funnel plot showing publication bias in detection rate analysis.

3. Detection Rate with Radio Tracer

- Risk Ratio (RR): 1.01 (95% CI: 0.80 to 1.28)
- Z-Value: 0.09 (p = 0.93)
- No significant difference when combining Methylene Blue with a radio tracer.

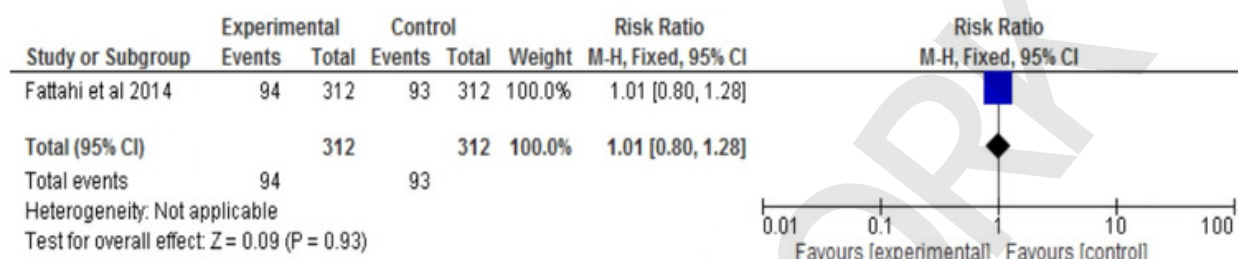


Figure 5: Forest plot showing detection rate with radio tracer comparison.

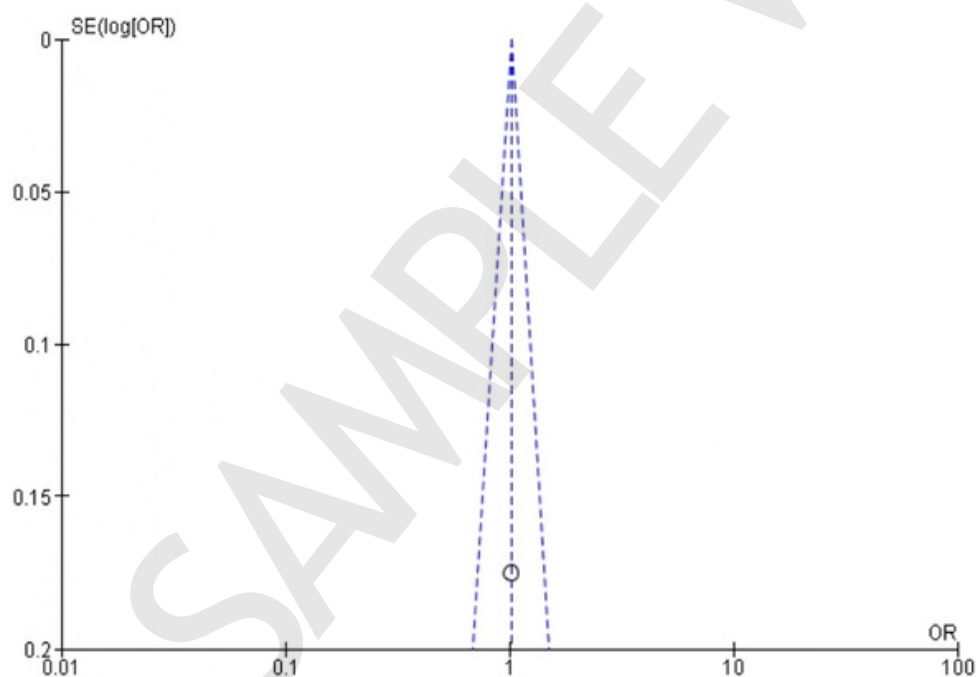


Figure 6: Funnel plot indicating publication bias.

5. Blue Tattoo Incidence

- Risk Ratio (RR): 0.58 (95% CI: 0.31 to 1.11),
- Z-Value: 1.65 (p=0.10)
- No statistically significant difference, but there may be a trend toward fewer incidences of blue tattoo with Methylene Blue.

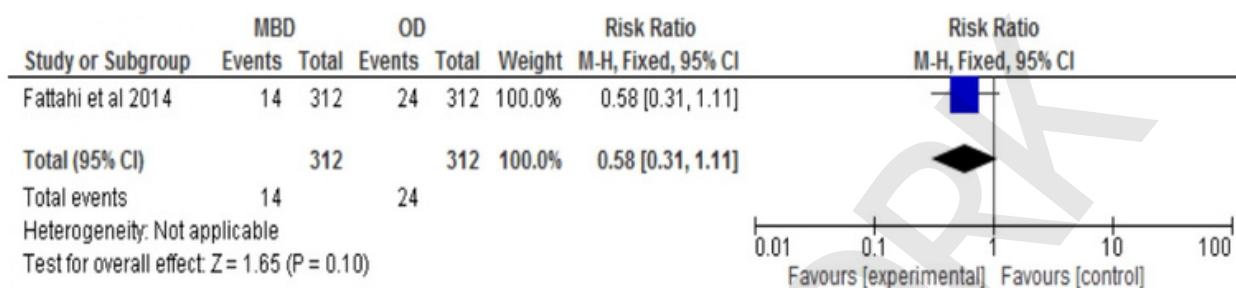


Figure 9: Forest plot showing blue tattooing comparison.

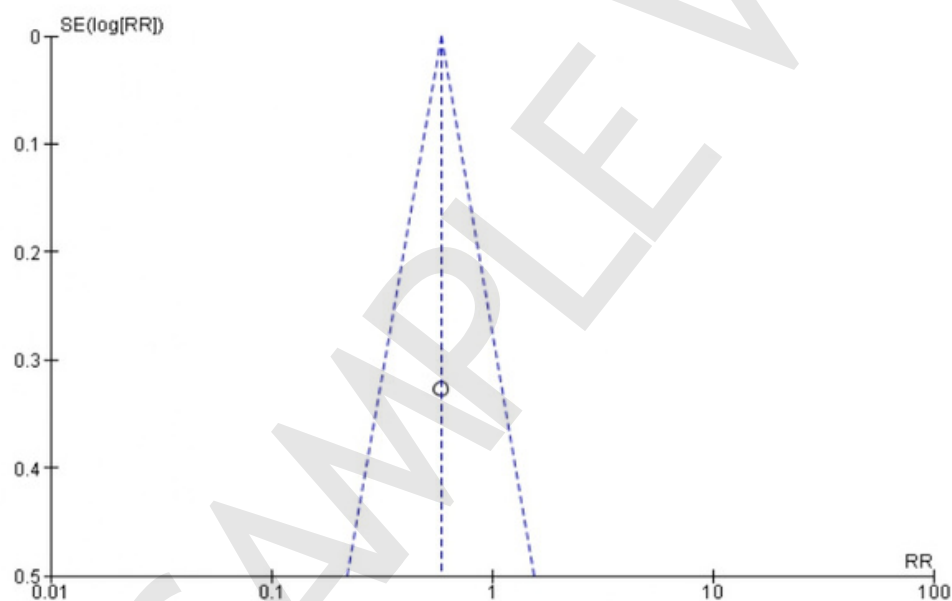


Figure 10: Funnel plot indicating publication bias in blue tattooing analysis.

4. Local Inflammation Comparison

- Risk Ratio (RR): 3.00 (95% CI: 0.31 to 28.68)
- Z-Value: 0.95 (p = 0.34)
- No significant difference in local inflammation outcomes.

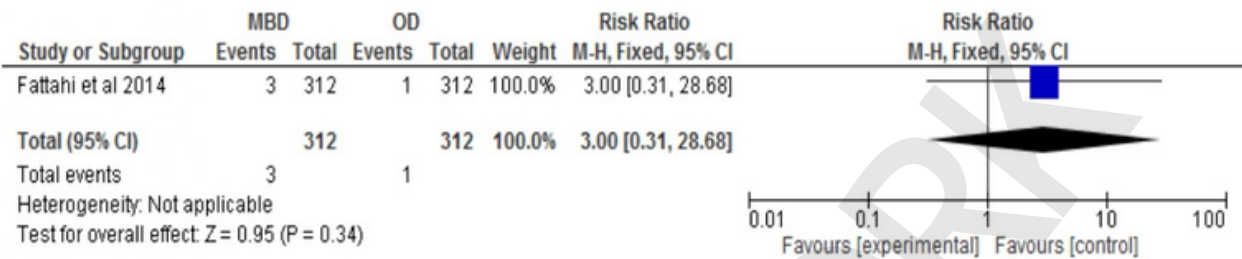


Figure 7: Forest plot summarizing local inflammation comparison.

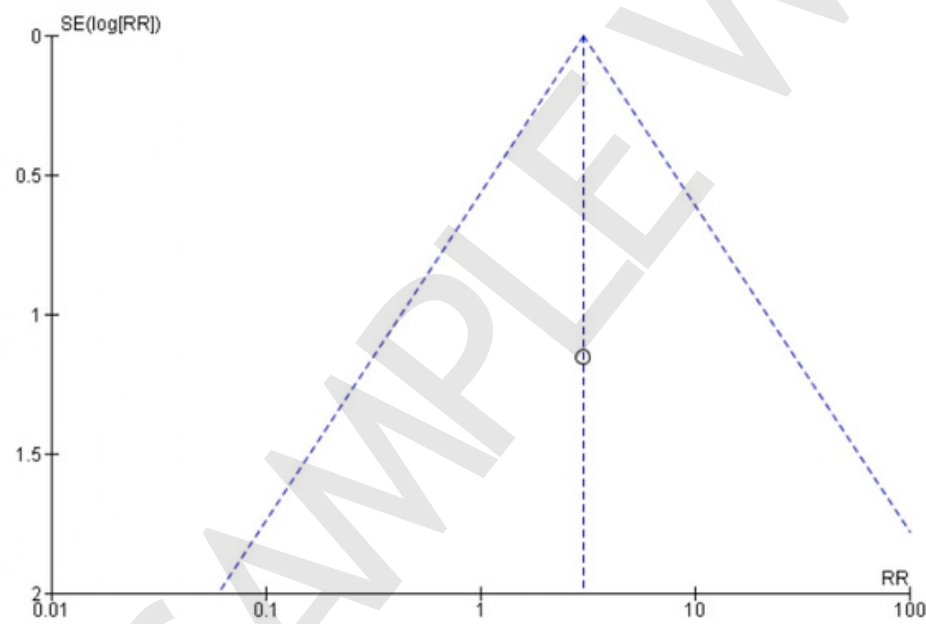


Figure 8: Funnel plot showing publication bias in local inflammation studies.

Conclusion

Our meta-analysis found **no significant differences** in accuracy, detection rates, local inflammation, or blue tattooing between Methylene Blue and other dyes in sentinel lymph node detection for breast cancer. In all analyses, we found **publication bias** related to small sample sizes and study designs. These findings emphasize the need for larger **RCTs** with stricter designs to have conclusive answers. Methylene Blue, however, should be always used, especially when considering the cost of dyes or the dye is hard to obtain.

Why Statswork?

Statswork provides full-service meta-analysis services that are custom fitted for researchers, health care practitioners and policymakers who want to make data-informed decisions. We guarantee:

- Study identification and data extraction will be precise
- Statistical analysis will be dependable, including forest and funnel plots
- Risk ratios, effect sizes, and publication bias will be reported transparently
- Recommendations for future research will be clear

Let Statswork take the pressure off your complicated data and help you change your data into manageable data-informed decisions.