Detecting the skewness of data from the five-number summary and its application in meta-analysis

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Abstract For clinical studies with continuous outcomes, when the data are potentially skewed, researchers may choose to report the whole or part of the five-number summary (the sample median, the first and third quartiles, and the minimum and maximum values) rather than the sample mean and standard deviation. In the recent literature, it is often suggested to transform the five-number summary back to the sample mean and standard deviation, which can be subsequently used in a meta-analysis. However, if a study contains skewed data, this transformation and hence the conclusions from the meta-analysis are unreliable. Therefore, we introduce a novel method for detecting the skewness of data using only the five-number summary and the sample size, and meanwhile, propose a new flow chart to handle the skewed studies in a different manner. We further show by simulations that our skewness tests are able to control the type I error rates and provide good statistical power, followed by a simulated meta-analysis and a real data example that illustrate the usefulness of our new method in meta-analysis and evidence-based medicine.

Keywords **Author Keywords:** Evidence-based medicine; five-number summary; flow chart; meta-analysis; skewness test

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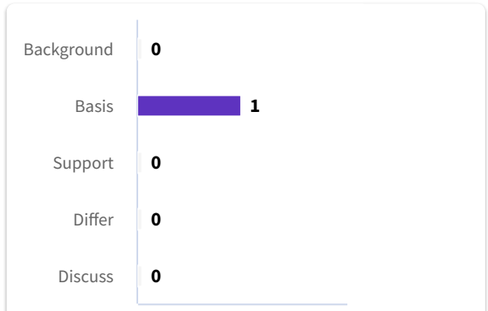

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