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LETTER TO THE EDITOR

95 % Confidence Interval: A Misunderstood Statistical Tool

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We read the article titled "Prospective randomized controlled trial comparing subepididymal orchiectomy versus conventional orchiectomy in metastatic carcinoma of prostate" by S. Bapat, P. M. Mahajan, A. A. Bhave, Y. B. Kshirsagar, Y. B. Sovani, and A. Mulay [1] with great interest. They found that the satisfaction score of group A patients who underwent subepididymal orchiectomy was 83.5±9.7 with 95 % confidence interval of 18.58–28.42. This confidence interval of 18.58–28.42 does not contain the mean satisfaction score of 83.5. The confidence interval for the satisfaction score of group B who underwent total orchiectomy was not mentioned.

The confidence interval provides a range of values which includes true parameter with a defined probability (coverage probability, confidence probability, or confidence level) defined in advance. The confidence level of 95 % is usually selected. This means that the confidence interval covers the true value in 95 of 100 studies performed [2].

Here is an example. Suppose Mr. A wishes to know the average mark gained by the final year students who have recently taken their professional examination. There are 250 students in the class. Mr. A talks to 20 students and records their marks. So, the class of 250 is the population and 20 students, who shared their marks with him, become the sample. If he finds that the mean mark of the sample is 78, then he might conclude that the average mark of the population must also be 78. Because he knows that he might have got a different mean mark if he had taken a different group of 20 students, he cannot conclude that the mean mark of the population is 78. This is the scenario where lies the importance of the confidence interval. Using his sample of 20 students, he calculates that the 95 % confidence interval for his sample mean is 72 to 84 (6 marks on either side of the sample mean). This means he is 95 % confident that the mean mark of the population will be between 72 and 84, but he cannot say where. If he wants to be 99 % certain, he would calculate the interval at the 99 % confidence level. Obviously, the range will be wider as he wants to be more certain of capturing the population mean. The confidence interval is calculated on either side of the sample mean.

Confidence intervals may also be used to determine whether two sample means are statistically significantly different. If the upper limit of the 95 % confidence interval of the lesser sample mean is below the lower limit of the 95 % confidence interval of the higher sample mean, then the confidence intervals do not overlap and the mean difference is statistically significant. However, the reverse is not correct. That is, it is not possible to draw any inference about statistical significance, either present or absent when 95 % confidence intervals for two samples means overlap [3].

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