Letter to Editor

Dear Editor-in-chief

The P-value has no relation to the severity of effectiveness. P-value represents only the odds of observed correlation. So, for example, when its value equals to 0.0001, indicates that 0.0001 is the probability of observed association might has been due to odds; and compared with P-value = 0.01, it doesn't indicate greater severity of association. In the studies that evaluate effectiveness of an intervention compared to placebo about binary outcomes, three indices: Absolute Risk Reduction (ARR), Relative Risk Reduction (RRR), and Number Needed to Treat (NNT) -to avoid a bad outcome- are indicating indices of the effectiveness and benefits of treatment. To understand these concepts, let us assume that an article from a randomized controlled clinical trial on the efficacy of the drug "Y" we have in hand. In this article is mentioned that among the 8000 patients with hypertension treated with the drug "X", 120 cases would experienced myocardial infarction (MI) after five years, and among 4000 patients treated with the drug "Y", 30 cases of MI would have occurred; In the control group were treated with placebo, 150 MI occurred among 8000 cases. RRR indicates risk reduction ratio of unfortunate outcomes (here: the risk of MI) in the intervention group versus the control group. To calculate it, difference in MI

risk in the intervention group and the control group will be divided into the risk of MIs.

In the above example, the RRR is calculated as Table 1.

RRR states that Drug "X" reduces the risk of MI by 20% compared to the control group. And administration of drug "Y" reduces this risk by 60% compared to the control group. A major imperfection of RRR is that cannot show outcome risk in the untreated group (control group) - the basic danger or CER. So it can not differentiate between effect sizes of large amount and small amount.

In contrast, ARR that calculated by subtracting the outcome risk in the control group and intervention group, clearly demonstrates the difference between these states when the baseline risk is high or low. So, it keeps the impact of baseline risk of outcome. For example, for the drug "X" and "Y", ARR is calculated as table 2.

ARR is more meaningful and suitable indicator to measure the effect size than the RRR.

On the other hand, to memorize the ARR and what it means for all treatment conditions and the work isn't very simple; therefore, a quantity called the NNT is defined. It is calculated as 1 diveded by ARR. In fact, NNT tells us that how many patients should be treated with an intended intervention to prevent occurrence of the one unfortunate outcome. RRR and ARR and NNT values for the above example are in the table 3.

The 267 patients with hypertension should be treated with drug "X" for 5 years to be prevented of one MI;

Table 1:

Risk in control group	Risk in exposure group		RRR= (CER –EER)/CER	
	X	Y	X	Y
150/8000 =1.875%	120/8000 = 1.5%	30/4000 = 0.75%	0.375/1.875 = 20%	1.8/1.875 = 60%

EER: Experimental Event Rate   CER: Control Event Rate

Table 2:

Risk in control group	Risk in exposure group		ARR= (CER –EER)	
	X	Y	X	Y
150/8000 =1.875%	120/8000 = 1.5%	30/4000 = 0.75%	1.875-1.5 = 0.375%	1.875-0.75 = 1.125%

Table 3:

Risk in exposure group		Risk in control group	RRR		ARR		NNT	
X	Y		X	Y	X	Y	X	Y
1.5%	0.75%	75/4000 =1.875%	20%	60%	0.375%	1.125%	1/0.00375 = 267	1/0.01125 = 89

nevertheless, it is 89 patients about drug "Y". This indicates greater effectiveness of drug "Y" than "X". So, NNT is the most appropriate index to determine the effectiveness of an intervention.

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