

Do Forest Plots Facilitate Visual Impression of Statistical Heterogeneity to Users of Meta-analysis? A Survey of Colombian Internists

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BACKGROUND

Forest plots (FP) are routinely used to facilitate visual understanding of consistency of results mainly across studies included in meta-analysis (MA). However, the extent to which visual impression reflects true I^2 , a statistical measure of heterogeneity, remains unknown.

METHODS

We conducted a self-administered survey of interpretation of heterogeneity across studies in FP. We built a bank of FP from Cochrane reviews including equal proportions of four levels of I^2 (0-24%, 25-49%, 50-74% and 75-100%), half of those with data tables included. We conducted an electronic survey within the membership of the Colombian Association of Internal Medicine. Respondents provided demographic information and were given educational/training material followed by a multiple-choice questionnaire with four randomly-allocated FP. They had to guess the right I^2 level for each plot. We report frequencies of right answers overall, by I^2 level, visual characteristics of the plots (presence of data, effect size, etc.) and subgroups of participants.

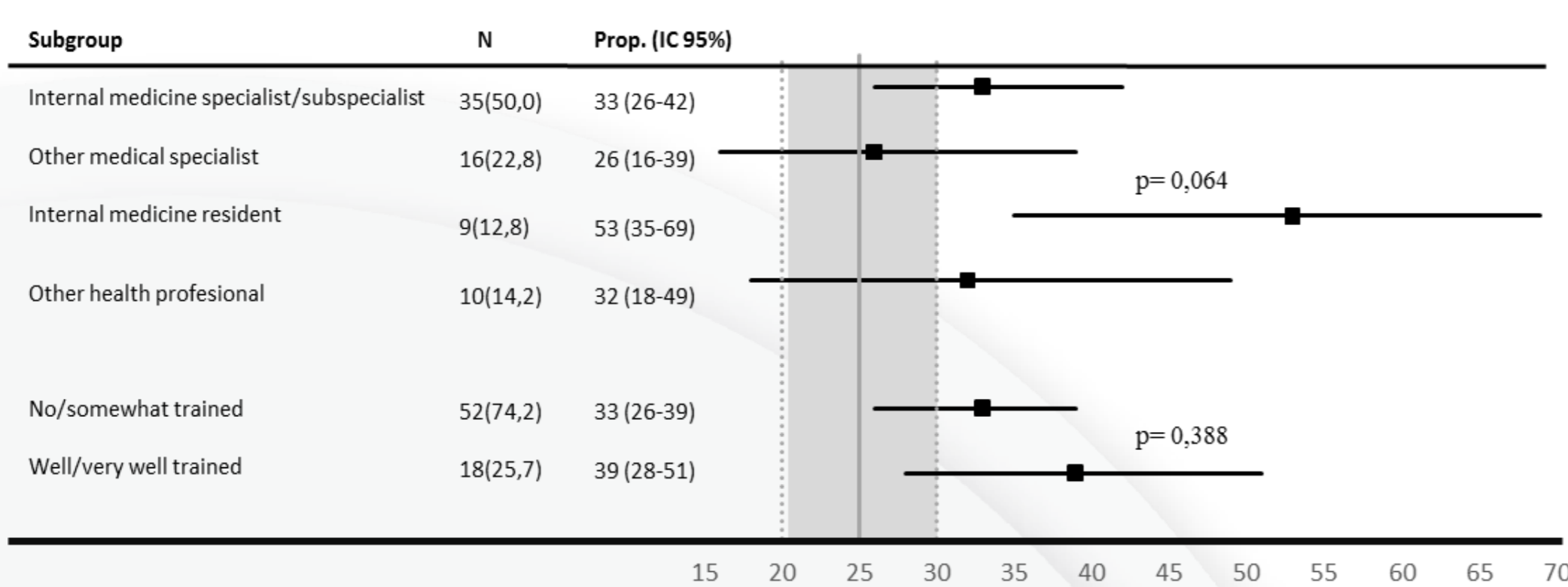


Figure 2. Proportion of correct answers by vocational training and self-perceive ability to interpret forest plots and statistic parameters in meta-analysis. Continues vertical line represents the probability of hitting by chance (along with the 95% confidence intervals) around the theoretical ¼, 25%

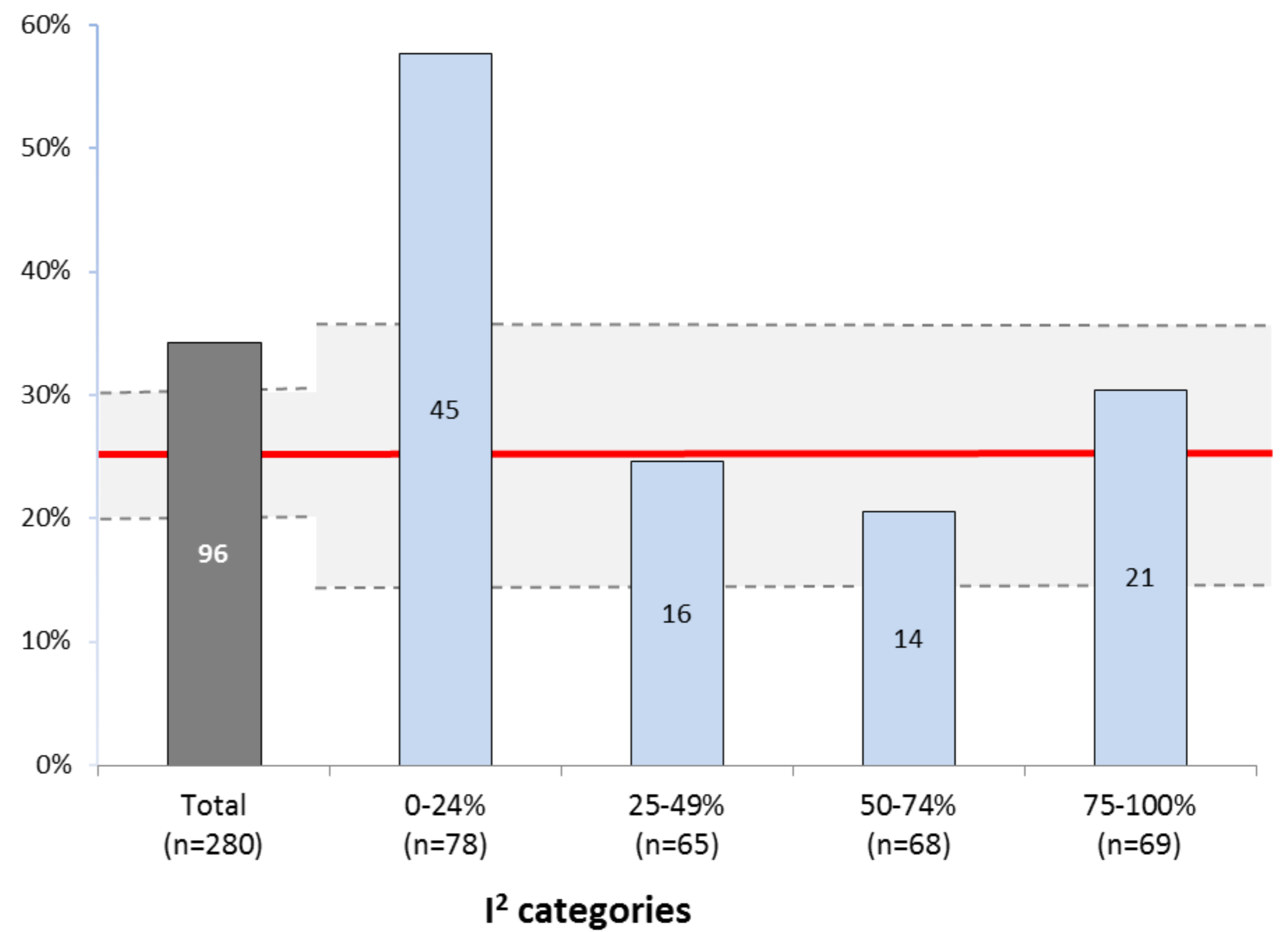


Figure 1. Proportion of correct answers for the whole test and by categories of heterogeneity (I^2). The shadowed area represents the probability of hitting by chance (along with the 95% confidence intervals) around the theoretical ¼, 25%

RESULTS

We recorded 70 questionnaires (280 answers, 280 FP). There were 96 (34.3% IC 95% 28.7-40.2) right answers, slightly above the null hypothesis (25%, IC 95% 20-30%). This was driven by a significantly higher proportion of right answers in the lowest (0-24%) level of I^2 (57.7%), compared with the other I^2 levels (24.6%; 20.6% and 30.4%, respectively) (Figure 1). These results were consistent across categories of visual display (Table 1). Vocational training, but not self-perceived ability to interpret FP modified favorably the interpretation (Figure 2).

CONCLUSIONS

Forest plots by themselves do not visually transmit heterogeneity levels in meta-analysis, except when the I^2 falls below 25%.

Visual display (n)	All P IC 95%	P	Proportion of correct answers (%)				
			0 - 24% (n=78)	25 - 49% (n=65)	50 - 74% (n=68)	75 - 100% (n=69)	
Reference lines	With data columns (137)	32,2 (25,8-40,3)	0,45	61,2	27,4	26,2	30,1
	Without data columns (143)	36,5 (28,1-45,4)		54,4	21,1	13,1	30,3
Effect size	Efect 0,8-1,25 (78)	37,4 (26,2-49,4)	0,575	55,6	16,2	23,2	20,4
	Efect <0,8 or >1,25 (202)	33,1 (27,5-40,4)		59,5	25,6	19,1	33,5
Number of events	≥283 Events (142)	37,2 (29,1-46,4)	0,314	63,1	28,3	22,3	26,7
	<283 Events (138)	31,8 (23,2-39,6)		55,8	22,1	13,2	37,2
Number studies included	2-5 studies (105)	31,2 (23,1-41,0)	0,516	47,2	20,8	8,8	37,2
	≥ 6 studies (175)	36,2 (29,6-43,2)		67,5	26,4	27,3	26,1

Table 1. Proportion of correct answers by characteristics of visual display of the forest graph for each level value of heterogeneity. The shaded area represents the proportion of correct answers above the probability of hitting by chance (along with the 95% confidence intervals) around the theoretical ¼, 25%