Example name Viagra Levitra Cialis

| Effect size | Risk ratio |
|---------------|----------------------------|
| Analysis type | Basic Subgroups analysis |
| Level | Intermediate |

Synopsis

The analysis includes 42 studies. All studies used the same paradigm, where patients suffering from erectile dysfunction were randomly assigned to either drug or placebo. Outcome was self-reports of improved function. The effect size was the risk ratio.

The active drug in some studies was Viagra, in some studies was Levitra, and in some studies was Cialis. We used subgroup analysis to see if the effect size varied by drug.

The original review includes various patient populations. For this example we use only studies based on the general population (excluding post-surgery patients, for example).

We use this example to show

- How to enter data from 2x2 tables
- How to get a sense of the weight assigned to each study
- How to interpret statistics for effect size
- How to interpret statistics for heterogeneity
- How to compute a prediction interval
- How to interpret a confidence interval and a prediction interval
- How to compare subgroup using a subgroups analysis
- How to compare subgroup using meta-regression

To open a CMA file > Download and Save file | Start CMA | Open file from within CMA

Download CMA file for computers that use a period to indicate decimals Download CMA file for computers that use a comma to indicate decimals

Download this PDF Download data in Excel Download trial of CMA

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Start the program

- Select the option [Start a blank spreadsheet]
- Click [Ok]

| † Con | nprehe | ensive | meta | analy | /sis - [| Data] | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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Click Insert > Column for > Study names

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The program displays this wizard

Select [Show all 100 formats] Click [Next]



Select [Comparison of two groups...] Click [Next]





Types of studies included

On this panel, select the type of studies to be included in this meta analysis. This controls the types of data entry options to be displayed on the next panel.

If unsure, select the first option, which is appropriate for most analyses. You will be able to return to this panel and change the selection.

- Comparison of two groups, time-points, or exposures (includes correlations)
- C Estimate of means, proportions or rates in one group at one time-point
- C Generic point estimates

C Generic point estimates, log scale

Drill down to

Dichotomous (number of events) Unmatched groups, prospective ... Events and sample size in each group

| Click on the icons to select the data entry format | |
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| Two groups or correlation | - |
| Dichotomous (number of events) | |
| Unmatched groups, prospective (e.g., controlled trials, cohort studies) | |
| Non-events and sample size in each group | _ |
| Events and non-events in each group | = |
| Event rate and sample size in each group | |
| Uni-squared and total sample size Matched groups, prospective (e.g., crossover trials or pre-post designe) | |
| Unmatched groups, prospective (e.g., crossover trials of pre-post designs) | |
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| 🔖 Rates (events by person years) | |
| 🎨 Survival (time to event) | |
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The program displays this wizard

Enter the following labels into the wizard

- First group > Drug
- Second group > Control
- Name for events > Improved
- Name for non-events > Not improved

Click [Ok] and the program will copy the names into the grid

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We need to add a column for the moderator, Drug

Click Insert > Column for > Moderator variable

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- Name the moderator > Drug
- Set the data type to Categorical
- Click Ok

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There are three options at this point

- Enter the data directly into CMA
- – or Open the CMA data file
- – or Copy the data from Excel

Here, we'll show how to copy the data from Excel

- Switch to Excel and open the file "Viagra Levitra Cialis.xls"
- Highlight the rows and columns as shown (Columns A to E only), and press CTRL-C to copy to clipboard

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| 1 | Study | Drug E | Drug N | Ctrl E | Ctrl N | Drug | | | | | | | | | |
| 2 | Becher, 2002 | 51 | 66 | 22 | 65 | Viagra | | | | | | | | | |
| 3 | Chen, 2001 | 97 | 110 | 43 | 111 | Viagra | | | | | | | | | |
| 4 | Choi, 2003 | 58 | 66 | 25 | 65 | Viagra | | | | | | | | | |
| 5 | Christiansen, 2000 | 79 | 96 | 27 | 105 | Viagra | | | | | | | | | |
| 6 | Dinsmore, 1999 | 46 | 57 | 10 | 54 | Viagra | | | | | | | | | |
| 7 | Glina, 2001 | 100 | 124 | 43 | 121 | Viagra | | | | | | | | | |
| 8 | Goldstein, 1998 | 217 | 302 | 50 | 200 | Viagra | | | | | | | | | |
| 9 | Gomez, 2002 | 58 | 76 | 38 | 82 | Viagra | | | | | | | | | |
| 10 | Heiman at al, 2007 | 59 | 85 | 23 | 91 | Viagra | | | | | | | | | |
| 11 | Jones, 2008 | 78 | 103 | 36 | 99 | Viagra | | | | | | | | | |
| 12 | Kadioglu, 2008 | 131 | 147 | 63 | 147 | Viagra | | | | | | | | | |
| 13 | Kongkanand, 2003 | 52 | 63 | 22 | 62 | Viagra | | | | | | | | | |
| 14 | Levinson, 2003 | 95 | 128 | 34 | 126 | Viagra | | | | | | | | | |
| 15 | Meuleman, 2001 | 126 | 159 | 38 | 156 | Viagra | | | | | | | | | |
| 16 | Montorsi, 1999 | 298 | 387 | 30 | 127 | Viagra | | | | | | | | | |
| 17 | Olsson, 2000 | 196 | 256 | 36 | 95 | Viagra | | | | | | | | | |

- Switch to CMA
- Click in cell Study-name 1

Click here

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- Press [CTRL-V] to paste the data
- The screen should look like this (only first rows are shown)

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| 2 | Becher, 2002 | 51 | 66 | 22 | 65 | 6.645 | 1.894 | 0.394 | 0.155 | | | | | | |
| 3 | Chen, 2001 | 97 | 110 | 43 | 111 | 11.800 | 2.468 | 0.354 | 0.125 | | | | | | |
| 4 | Choi, 2003 | 58 | 66 | 25 | 65 | 11.600 | 2.451 | 0.455 | 0.207 | | | | | | |
| 5 | Christiansen, 2000 | 79 | 96 | 27 | 105 | 13.425 | 2.597 | 0.348 | 0.121 | | | | | | |
| 6 | Dinsmore, 1999 | 46 | 57 | 10 | 54 | 18.400 | 2.912 | 0.485 | 0.235 | | | | | | |
| 7 | Glina, 2001 | 100 | 124 | 43 | 121 | 7.558 | 2.023 | 0.296 | 0.088 | | | | | | |
| 8 | Goldstein, 1998 | 217 | 302 | 50 | 200 | 7.659 | 2.036 | 0.207 | 0.043 | | | | | | |
| 9 | Gomez, 2002 | 58 | 76 | 38 | 82 | 3.731 | 1.317 | 0.349 | 0.122 | | | | | | |
| 10 | Heiman at al, 2007 | 59 | 85 | 23 | 91 | 6.709 | 1.903 | 0.337 | 0.114 | | | | | | |
| 11 | Jones, 2008 | 78 | 103 | 36 | 99 | 5.460 | 1.697 | 0.311 | 0.096 | | | | | | |
| 12 | Kadioglu, 2008 | 131 | 147 | 63 | 147 | 10.917 | 2.390 | 0.313 | 0.098 | | | | | | |
| 13 | Kongkanand, 2003 | 52 | 63 | 22 | 62 | 8.595 | 2.151 | 0.425 | 0.181 | | | | | | |
| 14 | Levinson, 2003 | 95 | 128 | 34 | 126 | 7.790 | 2.053 | 0.285 | 0.081 | | | | | | |
| 15 | Meuleman, 2001 | 126 | 159 | 38 | 156 | 11.856 | 2.473 | 0.270 | 0.073 | | | | | | |
| 16 | Montorsi, 1999 | 298 | 387 | 30 | 127 | 10.826 | 2.382 | 0.241 | 0.058 | | | | | | |
| 17 | Olsson, 2000 | 196 | 256 | 36 | 95 | 5.354 | 1.678 | 0.258 | 0.066 | | | | | | |
| 10 | Padma-Nathan | 101 | 120 | 22 | 110 | 11 010 | 2 470 | 0.204 | 0.092 | | | | | | |

- Switch to Excel ٠
- Highlight the column for Drug and click [CTRL-C] •

| III. HOME INSERT PAGE LAYOUT FORMULAS DATA REVEW VIEW ACROBAT 1 | | | SERT | PAGE LAYC | OUT FC | RMULAS | DATA | REV | TEW VIEV | V ACRO | BAT | | | | | | | |
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| 17 Olsson, 2000 196 256 36 95 5,354 1,678 0,258 0,066 Viaora | Com ile <u>Ec</u> un ana 2 Be 3 Ch Dir 7 Gli 8 Go 9 D He 11 Jon 12 Ka 13 Ko 14 Lb 15 Me | Switch Click th Press (Press (| analysis - CTRL- Insert Improved Drug E Drug E 5 9 5 7 4 10 21 5 7 7 4 10 21 5 7 7 4 10 21 5 7 7 4 10 21 5 7 7 4 10 21 21 5 7 7 4 10 21 21 21 21 21 21 21 21 21 21 21 21 21 | VIA II Drug V to p [Data] Identify I I II I II Drug Total N Drug Total N Drug 1 11 8 6 9 9 9 9 8 5 0 12 7 30 8 7 9 8 8 10 1 14 2 6 5 12 6 15 1 2 | g − 1 aste t cools Con & E Contro S S S S S S S S S S S S S | he dat mutationa | I options | Analys analys aratio 6.645 11.800 11.600 3.425 13.425 13.425 3.731 6.769 3.731 6.709 5.769 0.917 8.595 7.790 0.917 1.856 | ses <u>H</u> elp 3 t.68 t ⁻¹ ← Log odds ratio 1.894 2.451 2.597 2.912 2.023 2.036 1.317 1.997 2.390 2.151 2.053 2.473 | ↓ → - Std Err 0.394 0.455 0.296 0.207 0.349 0.337 0.313 0.425 0.285 0.285 | Click | here Drug Drug Drug Drug Viagra Viagra Viagra Viagra Viagra Viagra Viagra Viagra Viagra Viagra Viagra Viagra Viagra | р к | | L | M | N | C |
| | Commile <u>E</u> co tun ana 3 Stut 3 Stut 3 Ch 4 Ch 5 Ch 6 Gi 9 Go 9 Go 9 Go 9 Go 10 He 11 Jon 11 Jon 12 Ka 13 Ko 14 Lefe 15 Mc | Switch Click th Press (Press (| analysis - CTRL- analysis - I Insert I I I I I I I Drug Improved Drug E 5 9 5 7 4 10 211 5 5 7 4 10 211 5 5 7 4 10 21 12 5 5 7 4 10 21 12 5 5 7 4 10 21 12 5 5 7 4 10 21 12 5 5 7 4 10 21 10 5 5 7 4 10 21 10 5 5 7 4 10 21 10 5 5 7 4 10 21 10 5 5 5 7 4 10 21 10 5 5 7 4 10 21 10 5 5 7 4 10 21 10 5 5 7 7 4 10 21 10 5 5 7 7 4 10 21 10 5 5 7 7 10 21 10 5 5 7 7 10 21 10 5 5 7 7 10 21 10 5 5 7 7 10 21 10 5 5 7 7 12 12 12 12 12 12 12 12 12 12 | VIA II Drug V to p [Data] Identify I I I Drug N 1 6 9 9 6 5 0 122 7 300 8 7 9 8 8 100 1 144 2 6 5 12 6 15 8 38 | g − 1 aste t sols Con & En (Conts Con Improve Ctrl E 6 0 6 6 6 7 4 2 2 6 5 3 7 3 8 9 7 7 | he dat aputationa | Ca I options ol Odd 65 105 54 121 2200 82 91 99 93 93 93 147 62 126 127 0 0 0 0 0 0 0 0 0 0 0 0 0 | Analys aratio 6.645 11.800 13.425 8.400 7.558 3.731 6.709 5.460 0.917 8.595 7.790 11.856 0.917 8.595 | ses <u>Help</u> Log odds ratio 1.894 2.468 2.451 2.597 2.912 2.033 1.317 1.903 1.697 2.330 2.151 2.053 2.473 2.473 2.473 2.473 | ↓ → - Std Err 0.394 0.354 0.455 0.348 0.485 0.296 0.207 0.349 0.337 0.313 0.425 0.285 0.285 0.270 0.241 | Click Click Variance Variance 0.155 0.225 0.020 0.122 0.038 0.044 0.099 0.038 0.043 0.089 0.038 0.089 0.073 0.058 0.07 0.058 0.07 0.058 0.07 0.058 0.07 0.05 0.05 0.05 0.05 0.05 0.05 0.05 | here prog | р к | | L | M | N | C |

At this point we should check that the data has been copied correctly

| , † (| comprehensive met | a analysis - [| Data] | | | | | 1.00 | | | | | | | |
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| | Study name | Drug Improved | Drug Total N | Control Improved | Control Total N | Odds ratio | Log odds ratio | Std Err | Variance | Drug | к | L | м | N | 0 |
| 1 | Study | Drug E | Drug N | Ctrl E | Ctrl N | | | | | Drug | | | | | |
| 2 | Becher, 2002 | 51 | 66 | 22 | 65 | 6.645 | 1.894 | 0.394 | 0.155 | Viagra | | | | | |
| 3 | Chen, 2001 | 97 | 110 | 43 | 111 | 11.800 | 2.468 | 0.354 | 0.125 | Viagra | | | | | |
| 4 | Choi, 2003 | 58 | 66 | 25 | 65 | 11.600 | 2.451 | 0.455 | 0.207 | Viagra | | | | | |
| 5 | Christiansen, 2000 | 79 | 96 | 27 | 105 | 13.425 | 2.597 | 0.348 | 0.121 | Viagra | | | | | |
| 6 | Dinsmore, 1999 | 46 | 57 | 10 | 54 | 18.400 | 2.912 | 0.485 | 0.235 | Viagra | | | | | |
| 7 | ' Glina, 2001 | 100 | 124 | 43 | 121 | 7.558 | 2.023 | 0.296 | 0.088 | Viagra | | | | | |
| 8 | Goldstein, 1998 | 217 | 302 | 50 | 200 | 7.659 | 2.036 | 0.207 | 0.043 | Viagra | | | | | |
| 9 | Gomez, 2002 | 58 | 76 | 38 | 82 | 3.731 | 1.317 | 0.349 | 0.122 | Viagra | | | | | |
| 10 | Heiman at al, 2007 | 59 | 85 | 23 | 91 | 6.709 | 1.903 | 0.337 | 0.114 | Viagra | | | | | |
| 11 | Jones, 2008 | 78 | 103 | 36 | 99 | 5.460 | 1.697 | 0.311 | 0.096 | Viagra | | | | | |
| 1.2 | Markara 2000 | 101 | 1.47 | c | 1.47 | 10.017 | 2,200 | 0.010 | 0.000 | S.C | | | | | |

- Click anywhere in Row 1
- Select Edit > Delete row, and confirm

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| ,† (| omp | rehensive meta an | alysis - [D | ata] | | | | | 1.00 | | | | | | | |
|-----------------|------------------|----------------------------------|---|-------------------|---------------------|--------------------|------------------|-------------------|----------------------------------|----------|----------------------------|--------------|---|---|---|---|
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| | l 🖸 | Restore data Column propertie | es | Drug Total N | Control Improved | Control Total N | Odds ratio | Log odds ratio | Std Err | Variance | Drug | к | L | м | N | 0 |
| 1 | | Companyation | Chillion C | Prug N | Ctrl E | Ctrl N | | | | | Drug | | | | | |
| 2 | 48 | Copy selection | Ctri+C | 66 | 22 | 65 | 6.645 | 1.894 | 0.394 | 0.155 | Viagra | | | | | |
| 3 | 1 | Copy with heade | r | 110 | 43 | 111 | 11.800 | 2.468 | 0.354 | 0.125 | Viagra | | | | | |
| 4 | | Copy entire grid | | 66 | 25 | 65 | 11.600 | 2.451 | 0.455 | 0.207 | Viagra | | | | | |
| 5 | 6 | Deete | Chilly | 96 | 27 | 105 | 13.425 | 2.597 | 0.348 | 0.121 | Viagra | | | | | |
| 6 | - | Paste | Ctri+v | 57 | 10 | 54 | 18.400 | 2.912 | 0.485 | 0.235 | Viagra | | | | | |
| 7 | * | Cut | Ctrl+X | 124 | 43 | 121 | 7.558 | 2.023 | 0.296 | 0.088 | Viagra | | | | | |
| 8 | n | Delete | Del | 302 | 50 | 200 | 7.659 | 2.036 | 0.207 | 0.043 | Viagra | | | | | |
| 9 | | Delete com | | 76 | 38 | 82 | 3.731 | 1.317 | 0.349 | 0.122 | Viagra | | | | | |
| 10 | | Delete row | 2 | 85 | 23 | 91 | 6.709 | 1.903 | 0.337 | 0.114 | Viagra | | | | | |
| 11 | | Delete study | , in the second s | 103 | 36 | 99 | 5.460 | 1.697 | 0.311 | 0.096 | Viagra | | | | | |
| 12 | 1 | Delete column | | 147 | 63 | 147 | 10.917 | 2.390 | 0.313 | 0.098 | Viagra | | | | | |
| 13 | | E 15 | | 63 | 22 | 62 | 8.595 | 2.151 | 0.425 | 0.181 | Viagra | | | | | |
| 14 | | Edit group name | 5 | 128 | 34 | 126 | 7.790 | 2.053 | 0.285 | 0.081 | Viagra | | | | | |
| 15 | Meu | leman, 2001 | 126 | 159 | 38 | 156 | 11.856 | 2.473 | 0.270 | 0.073 | Viagra | | | | | |
| 16 | Mon | torsi, 1999 | 298 | 387 | 30 | 127 | 10.826 | 2.382 | 0.241 | 0.058 | Viagra | | | | | |
| 17 | Olss | on, 2000 | 196 | 256 | 36 | 95 | 5.354 | 1.678 | 0.258 | 0.066 | Viagra | | | | | |
| 18 | Pad | ma-Nathan, | 101 | 136 | 23 | 118 | 11.919 | 2.478 | 0.304 | 0.092 | Viagra | | | | | |
| 10 | Tan | 2000 | 109 | 125 | /0 | 121 | 13 795 | 2 624 | 0.330 | 0.109 | Viagra | | | | | |

The screen should look like this (top rows shown)

| ; † C | omprehensive meta | analysis - [[| Data] | | | | | | | | | | | | |
|--------------|---------------------------------|---------------------|---------------------|---------------------|--------------------|-------------------|-------------------|------------------------------|----------|---------|---|---|---|---|---|
| <u>F</u> ile | <u>E</u> dit Format <u>V</u> ie | w <u>I</u> nsert Id | lentify <u>T</u> oo | ols Comput | ational opt | tions Analy | ses <u>H</u> elp | | | | | | | | |
| Run | analyses → 🏷 [|) 🚅 🖷 🛛 | | (🖻 🛍 | <u>ا ا ا</u> | '= * ≣ ≠° | 8 tas 🕂 👻 | \downarrow \rightarrow - | ⊢ ✓ 🗆 | ≜i zi 🤅 |) | | | | |
| | Study name | Drug Improved | Drug Total N | Control Improved | Control Total N | Odds ratio | Log odds ratio | Std Err | Variance | Drug | К | L | м | N | 0 |
| 1 | Becher, 2002 | 51 | 66 | 22 | 65 | 6.645 | 1.894 | 0.394 | 0.155 | Viagra | | | | | |
| 2 | Chen, 2001 | 97 | 110 | 43 | 111 | 11.800 | 2.468 | 0.354 | 0.125 | Viagra | | | | | |
| 3 | Choi, 2003 | 58 | 66 | 25 | 65 | 11.600 | 2.451 | 0.455 | 0.207 | Viagra | | | | | |
| 4 | Christiansen, 2000 | 79 | 96 | 27 | 105 | 13.425 | 2.597 | 0.348 | 0.121 | Viagra | | | | | |
| 5 | Dinsmore, 1999 | 46 | 57 | 10 | 54 | 18.400 | 2.912 | 0.485 | 0.235 | Viagra | | | | | |
| 6 | Glina, 2001 | 100 | 124 | 43 | 121 | 7.558 | 2.023 | 0.296 | 0.088 | Viagra | | | | | |
| 7 | Goldstein, 1998 | 217 | 302 | 50 | 200 | 7.659 | 2.036 | 0.207 | 0.043 | Viagra | | | | | |
| 8 | Gomez, 2002 | 58 | 76 | 38 | 82 | 3.731 | 1.317 | 0.349 | 0.122 | Viagra | | | | | |
| 9 | Heiman at al, 2007 | 59 | 85 | 23 | 91 | 6.709 | 1.903 | 0.337 | 0.114 | Viagra | | | | | |
| 10 | Jones, 2008 | 78 | 103 | 36 | 99 | 5.460 | 1.697 | 0.311 | 0.096 | Viagra | | | | | |
| 11 | Kadioglu, 2008 | 131 | 147 | 63 | 147 | 10.917 | 2.390 | 0.313 | 0.098 | Viagra | | | | | |
| 12 | Kongkanand, 2003 | 52 | 63 | 22 | 62 | 8.595 | 2.151 | 0.425 | 0.181 | Viagra | | | | | |
| 13 | Levinson, 2003 | 95 | 128 | 34 | 126 | 7.790 | 2.053 | 0.285 | 0.081 | Viagra | | | | | |
| 14 | Meuleman, 2001 | 126 | 159 | 38 | 156 | 11.856 | 2.473 | 0.270 | 0.073 | Viagra | | | | | |
| 15 | Montorsi, 1999 | 298 | 387 | 30 | 127 | 10.826 | 2.382 | 0.241 | 0.058 | Viagra | | | | | |
| 16 | Olsson, 2000 | 196 | 256 | 36 | 95 | 5.354 | 1.678 | 0.258 | 0.066 | Viagra | | | | | |
| 17 | Padma-Nathan, | 101 | 136 | 23 | 118 | 11.919 | 2.478 | 0.304 | 0.092 | Viagra | | | | | |
| 18 | Tan, 2000 | 109 | 125 | 40 | 121 | 13.795 | 2.624 | 0.330 | 0.109 | Viagra | | | | | |
| 19 | Young, 2002 | 166 | 207 | 70 | 203 | 7.693 | 2.040 | 0.229 | 0.052 | Viagra | | | | | |
| 20 | Carson, 2004 | 135 | 219 | 31 | 206 | 9.073 | 2.205 | 0.239 | 0.057 | Levitra | | | | | |
| 21 | Edwards, 2006 | 150 | 190 | 24 | 64 | 6.250 | 1.833 | 0.314 | 0.098 | Levitra | | | | | |

By default, the program is displaying the odds ratio as the effect size

We want to switch to the risk ratio

- Right-click on any of the yellow columns
- Click Customize computed effect size display

| ,† C | omprehensive meta | a analysis - [l | Data] | | | | | 1.00 | | | | | | | | |
|-----------------|---------------------------------|------------------|--------------------|---------------------|--------------------|-------------|-------------------|----------------------------|----------------|---------|---|---|---|---|---|--|
| <u>F</u> ile | <u>E</u> dit Format <u>V</u> ie | w Insert Io | lentify <u>T</u> o | ols Compu | tational op | tions Analy | ses <u>H</u> elp | | | | | | | | | |
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| | Study name | Drug Improved | Drug Total N | Control Improved | Control Total N | Odds ratio | Log odds ratio | Std Err | Variance | Drug | К | L | м | N | 0 | |
| 1 | Becher, 2002 | 51 | 66 | 22 | 65 | 6.645 | 1.894 | 0.394 | 0.155 | Viagra | | | | | | |
| 2 | Chen, 2001 | 97 | 110 | 43 | 111 | 11.800 | 2.468 | 0.354 | 0.125 | Viagra | | | | | | |
| 3 | Choi, 2003 | 58 | 66 | 25 | 65 | 11.600 | 2.451 | 0.455 | 0.207 | Viagra | | | | | | |
| 4 | Christiansen, 2000 | 79 | 96 | 27 | 105 | 13.425 | 2.597 | 0.348 | 0.121 | Viagra | | | | | | |
| 5 | Dinsmore, 1999 | 46 | 57 | 10 | 54 | 18.400 | 2.912 | 0.485 | 0.235 | Viagra | | | | | | |
| 6 | Glina, 2001 | 100 | 124 | 43 | 121 | 7.558 | 2.023 | 0.296 | 0.088 | Viagra | | | | | | |
| - 7 | Goldstein, 1998 | 217 | 302 | 50 | 200 | 7.659 | 2.036 | 0.207 | 0.043 | Viagra | | | | | | |
| 8 | Gomez, 2002 | 58 | 76 | 38 | 82 | 3.731 | 1.317 | 0.349 | 0.122 | Viagra | | | | | | |
| 9 | Heiman at al, 2007 | 59 | 85 | 23 | 91 | €Ą↓ | Sort A-Z | | | | | | | | | |
| 10 | Jones, 2008 | 78 | 103 | 36 | 99 | 5 Z] | Sort 7-A | | | | | | | | | |
| 11 | Kadioglu, 2008 | 131 | 147 | 63 | 147 | 10 🏯 | | | | | | | | | | |
| 12 | Kongkanand, 2003 | 52 | 63 | 22 | 62 | 8 | Column pro | operties | | | | | | | | |
| 13 | Levinson, 2003 | 95 | 128 | 34 | 126 | 7 | Data ontro | accistant | | | | | | | | |
| 14 | Meuleman, 2001 | 126 | 159 | 38 | 156 | 11 | | assistant | | | | | | | | |
| 15 | Montorsi, 1999 | 298 | 387 | 30 | 127 | 10 2 | Formulas | | | | | | | | | |
| 16 | Olsson, 2000 | 196 | 256 | 36 | 95 | 5 000 | Show all se | lected indice | s | | | | | | | |
| 17 | Padma-Nathan, | 101 | 136 | 23 | 118 | 11 000 | Channah | | - | | | | | | | |
| 18 | Tan, 2000 | 109 | 125 | 40 | 121 | 13 | show only | the primary i | ndex | | | | | | | |
| 19 | Young, 2002 | 166 | 207 | 70 | 203 | 7 % | Set primary | index to Od | ds ratio | | | | | | | |
| 20 | Carson, 2004 | 135 | 219 | 31 | 206 | ° + | Customize | computed e | ffect size dis | nlav | | | | | | |
| 21 | Edwards, 2006 | 150 | 190 | 24 | 64 | 6 | Casconnize | computed e | | | | | | | | |
| 22 | Hatzichristou, 2004 | 112 | 130 | 39 | 109 | 11.168 | 2.413 | 0.323 | 0.104 | Levitra | | | | | | |
| 0.00 | | 070 | 507 | | 100 | 0.004 | 0.110 | 0.017 | 0.047 | 1 N | | | | | | |

© <u>www.Meta-Analysis.com</u>

| ,† C | omprehensive meta | a analysis - [[| Data] | | | | | | | |
|-----------------|---------------------------------|---------------------|--------------------|---------------------|--------------------|-------------|-------------------|--|---|---|
| <u>F</u> ile | <u>E</u> dit Format <u>V</u> ie | w <u>I</u> nsert Id | entify <u>T</u> oo | ls Comput | ational opt | ions Analy: | ses <u>H</u> elp | | | |
| Run | analyses 🔸 🗞 [|) 🚅 🖷 🕻 | a 🚳 🐰 | • • • | <u>ر</u> ا 🔊 | = *≣ # | 8 ta 👬 🧃 | $\boxed{\downarrow \rightarrow + \checkmark \Box} \triangleq \downarrow $ | | |
| | Study name | Drug Improved | Drug Total N | Control Improved | Control Total N | Odds ratio | Log odds ratio | Effect size indices | N | 0 |
| 1 | Becher, 2002 | 51 | 66 | 22 | 65 | 6.645 | 1.894 | | | |
| 2 | Chen, 2001 | 97 | 110 | 43 | 111 | 11.800 | 2.468 | Use the following as the primary index | | |
| 3 | Choi, 2003 | 58 | 66 | 25 | 65 | 11.600 | 2.451 | | | |
| 4 | Christiansen, 2000 | 79 | 96 | 27 | 105 | 13.425 | 2.597 | Risk ratio | | |
| 5 | Dinsmore, 1999 | 46 | 57 | 10 | 54 | 18.400 | 2.912 | | | |
| 6 | Glina, 2001 | 100 | 124 | 43 | 121 | 7.558 | 2.023 | Display columns for these indices | | |
| 7 | Goldstein, 1998 | 217 | 302 | 50 | 200 | 7.659 | 2.036 | | | |
| 8 | Gomez, 2002 | 58 | 76 | 38 | 82 | 3.731 | 1.317 | Odds ratio | | |
| 9 | Heiman at al, 2007 | 59 | 85 | 23 | 91 | 6.709 | 1.903 | Log odds ratio | | |
| 10 | Jones, 2008 | 78 | 103 | 36 | 99 | 5.460 | 1.697 | Peto odds ratio | | |
| 11 | Kadioglu, 2008 | 131 | 147 | 63 | 147 | 10.917 | 2.390 | Log Peto odds ratio | | |
| 12 | Kongkanand, 2003 | 52 | 63 | 22 | 62 | 8.595 | 2.151 | ✓ Risk ratio | | |
| 13 | Levinson, 2003 | 95 | 128 | 34 | 126 | 7.790 | 2.053 | Euglisk fatto Eisk difference | | |
| 14 | Meuleman, 2001 | 126 | 159 | 38 | 156 | 11.856 | 2.473 | Std diff in means | | |
| 15 | Montorsi, 1999 | 298 | 387 | 30 | 127 | 10.826 | 2.382 | | | |
| 16 | Olsson, 2000 | 196 | 256 | 36 | 95 | 5.354 | 1.678 | Difference in means | | |
| 17 | Padma-Nathan, | 101 | 136 | 23 | 118 | 11.919 | 2.478 | Std Paired Difference | | |
| 18 | Tan, 2000 | 109 | 125 | 40 | 121 | 13.795 | 2.624 | | | |
| 19 | Young, 2002 | 166 | 207 | 70 | 203 | 7.693 | 2.040 | □ Fisher's Z | | |
| 20 | Carson, 2004 | 135 | 219 | 31 | 206 | 9.073 | 2.205 | Rate ratio | | |
| 21 | Edwards, 2006 | 150 | 190 | 24 | 64 | 6.250 | 1.833 | Log rate ratio | | |
| 22 | Hatzichristou, 2004 | 112 | 130 | 39 | 109 | 11.168 | 2.413 | Rate difference | | |
| 23 | Hellstrom, 2002 | 373 | 527 | 34 | 150 | 8.264 | 2.112 | Hazard ratio | | |
| 24 | Martin-Morales, | 170 | 208 | 25 | 71 | 8.232 | 2.108 | Also show standard error | | |
| 25 | Nagao, 2004 | 170 | 208 | 25 | 71 | 8.232 | 2.108 | | | |
| 26 | Porst, 2001 | 300 | 407 | 40 | 134 | 6.589 | 1.885 | | | |
| 27 | Ralph, 2007 | 374 | 446 | 39 | 142 | 13.719 | 2.619 | C Show the primary index only | | |
| 28 | Tan, 2008 | 216 | 264 | 17 | 70 | 14.029 | 2.641 | C Chew all selected indices | | |
| 29 | Valiquette, 2005 | 206 | 255 | 82 | 254 | 8.818 | 2.177 | > oriuw all selected indices | | |
| - 30 | Carrier, 2005 | 148 | 203 | 11 | 50 | 9.540 | 2.256 | | | |
| 31 | Carson, 2005 | 105 | 143 | 7 | 48 | 16.184 | 2.784 | Ok | | |
| 32 | Chen, 2004 | 115 | 130 | 36 | 66 | 6.389 | 1.855 | Cancel | | |
| 33 | Choi, 2006 | 64 | 80 | 18 | 41 | 5.111 | 1.631 | | | |
| 34 | Eardley, 2004 | 134 | 162 | 11 | 48 | 16.097 | 2.779 | U.401 U.161 Liaiis | | |
| | | | | | | | | | | |

- Tick Risk ratio
- Tick Log risk ratio
- Select Risk ratio in the drop-down box in the wizard
- De-select Odds ratio
- De-select log odds ratio
- Click Ok

The program now display the risk ratio rather than the odds ratio

Click File > Save As and save the file

| • | comprehensive meta | a analysis | - [C | :\Users\Bio | ostat\Dropbo | ox\Worksh | ops Three-D | ay\Erectile D | ysfunction() | Viagra Leviti | ra Cialis.cma | 3] | | | | |
|------------|-----------------------------------|------------------|------|--------------------|---------------------|--------------------|-----------------|-------------------|----------------------------|---------------|---------------|----|---|---|---|---|
| Eil | <u>e E</u> dit Format <u>V</u> ie | w <u>I</u> nsert | Id | entify <u>T</u> oo | ols Comput | tational opt | tions Analy | ses <u>H</u> elp | | | | | | | | |
| | New | • | | 1 🔿 X | 6 🖻 🛍 | 2a 🛏 | }= }≣ ⊀ | 8 ta 🕂 🔸 | $\downarrow \rightarrow$ - | ⊢ ✓ 🗆 | ≜i Zi Q | Q | | | | |
| | Open Opening screen wi | Ctrl+O | | Drug Total N | Control Improved | Control Total N | Risk ratio | Log risk ratio | Std Err | Variance | Drug | к | L | м | N | O |
| | , opening screen m | 2010 | 51 | 66 | 22 | 65 | 2.283 | 0.826 | 0.186 | 0.035 | Viagra | | | | | |
| | Import | | 97 | 110 | 43 | 111 | 2.276 | 0.823 | 0.124 | 0.015 | Viagra | | | | | |
| | Save | Ctrl+S | 58 | 66 | 25 | 65 | 2.285 | 0.826 | 0.163 | 0.027 | Viagra | | | | | |
| | | - Curris | 79 | 96 | 27 | 105 | 3.200 | 1.163 | 0.172 | 0.030 | Viagra | | | | | |
| i | Save <u>A</u> s | 5 | 46 | 57 | 10 | 54 | 4.358 | 1.472 | 0.293 | 0.086 | Viagra | | | | | |
| a | Print | Ctrl+P | bo | 124 | 43 | 121 | 2.269 | 0.819 | 0.130 | 0.017 | Viagra | | | | | |
| E I I IIII | Drint setup | | 17 | 302 | 50 | 200 | 2.874 | 1.056 | 0.128 | 0.016 | Viagra | | | | | |
| 1 = | Finit Setup | | 58 | 76 | 38 | 82 | 1.647 | 0.499 | 0.135 | 0.018 | Viagra | | | | | |
| | Exit | | 59 | 85 | 23 | 91 | 2.746 | 1.010 | 0.194 | 0.038 | Viagra | | | | | |
| 1 | Jones, 2008 | | 78 | 103 | 36 | 99 | 2.083 | 0.734 | 0.144 | 0.021 | Viagra | | | | | |
| 1 | 1 Kadioglu, 2008 | 1 | 31 | 147 | 63 | 147 | 2.079 | 0.732 | 0.100 | 0.010 | Viagra | | | | | |
| 1 | 2 Kongkanand, 2003 | | 52 | 63 | 22 | 62 | 2.326 | 0.844 | 0.181 | 0.033 | Viagra | | | | | |
| 1: | 3 Levinson, 2003 | | 95 | 128 | 34 | 126 | 2.750 | 1.012 | 0.156 | 0.024 | Viagra | | | | | |
| 1. | 4 Meuleman, 2001 | 1 | 26 | 159 | 38 | 156 | 3.253 | 1.180 | 0.147 | 0.022 | Viagra | | | | | |
| 1! | Montorsi, 1999 | 2 | 98 | 387 | 30 | 127 | 3.260 | 1.182 | 0.162 | 0.026 | Viagra | | | | | |
| 1 | 6 Olsson, 2000 | 1 | 96 | 256 | 36 | 95 | 2.020 | 0.703 | 0.136 | 0.018 | Viagra | | | | | |
| | | | ~ | 4.000 | | | 0.040 | 4 000 | 0.404 | 0.000 | | | | | | |

計 Comprehensive meta analysis - [C:\Users\Biostat\Dropbox\Workshops Three-Day\Erectile Dysfunction\Viagra Levitra Cialis.cma]

Note that the file name is now in the header.

- [Save] will over-write the prior version of this file without warning
- [Save As...] will allow you to save the file with a new name

| ļ | -† Co | omprehensive meta | anal sis - [| C:\Users\Bi | ostat\Dropb | ox\Worksho | ops Three-Da | ay\Erectile D | ysfunction\ | Viagra Le itr | ra Cialis.cm | 3] | | | | |
|---|--------------|----------------------------------|---------------------|--------------------|---------------------|--------------------|--------------|-------------------|----------------------------|---------------|-------------------------|----|---|---|---|---|
| | <u>F</u> ile | <u>E</u> dit Format <u>V</u> iew | w <u>Insert I</u> c | lentify <u>T</u> o | ole Comput | tational opt | tions Analy | rer <u>H</u> elp | | | | | | | | |
| | Run | analyses 🔸 🗞 🛛 |) 🚅 🖷 🕻 | 3 🔿 3 | 6 🖻 🛍 | æ •-• | '= *≣ ≉ | 8 1.0 11 - | $\downarrow \rightarrow -$ | + イ 🗌 | ≜ ↓ Z ↓ 0 | Q | | | | |
| | | Study name | Drug Improved | Drug Total N | Control Improved | Control Total N | Risk ratio | Log risk ratio | Std Err | Variance | Drug | К | L | м | N | 0 |
| | 1 | Becher, 2002 | 51 | 66 | 22 | 65 | 2.283 | 0.826 | 0.186 | 0.035 | Viagra | | | | | |
| | 2 | Chen, 2001 | 97 | 110 | 43 | 111 | 2.276 | 0.823 | 0.124 | 0.015 | Viagra | | | | | |
| | 3 | Choi, 2003 | 58 | 66 | 25 | 65 | 2.285 | 0.826 | 0.163 | 0.027 | Viagra | | | | | |
| | 4 | Christiansen, 2000 | 79 | 96 | 27 | 105 | 3.200 | 1.163 | 0.172 | 0.030 | Viagra | | | | | |
| | 5 | Dinsmore, 1999 | 46 | 57 | 10 | 54 | 4.358 | 1.472 | 0.293 | 0.086 | Viagra | | | | | |
| | 6 | Glina, 2001 | 100 | 124 | 43 | 121 | 2.269 | 0.819 | 0.130 | 0.017 | Viagra | | | | | |
| | - 7 | Goldstein, 1998 | 217 | 302 | 50 | 200 | 2.874 | 1.056 | 0.128 | 0.016 | Viagra | | | | | |
| | 8 | Gomez, 2002 | 58 | 76 | 38 | 82 | 1.647 | 0.499 | 0.135 | 0.018 | Viagra | | | | | |
| | 9 | Heiman at al, 2007 | 59 | 85 | 23 | 91 | 2.746 | 1.010 | 0.194 | 0.038 | Viagra | | | | | |
| | 10 | Jones, 2008 | 78 | 103 | 36 | 99 | 2.083 | 0.734 | 0.144 | 0.021 | Viagra | | | | | |
| | 11 | Kadioglu, 2008 | 131 | 147 | 63 | 147 | 2.079 | 0.732 | 0.100 | 0.010 | Viagra | | | | | |
| | | | | | | | | | | | | | | | | |

By convention we've put the treated group (Drug) in the first two columns and the control (placebo) in the second two columns. Also by convention, we've defined "Event" as the presence of the outcome (improvement).

When we follow these conventions, and if the treated group does better than the control, then

- If the "event" is a bad outcome (such as relapse), the risk ratio will be less than 1.
- If the "event" is a good outcome (such as improvement), the risk ratio will be greater than 1.

Therefore, in the present case, a risk ratio greater than 1 indicates that patients treated with drug were more likely to improve then those treated with placebo.

It's always a good idea to check at least one study and make sure that we have the direction right. For this purpose we'll use the first study (Becher), where the risk ratio is high, and the distinction between groups should be clear.

| • | Comprehensive meta | a analysis - [(| C:\Users\Bi | ostat\Dropbo | ox\Worksho | ops Three-D | ay\Erectile D | ysfunction\ | Viagra Leviti | ra Cialis.cma |] | | | | |
|-----|-----------------------------------|---------------------|--------------------|---------------------|--------------------|-------------|-------------------|----------------------------|---------------|-------------------------|---|---|---|---|---|
| Eil | e <u>E</u> dit Format <u>V</u> ie | w <u>I</u> nsert Id | lentify <u>T</u> o | ols Comput | ational opt | ions Analy | ses <u>H</u> elp | | | | | | | | |
| Ru | in analyses → 🎕 [|) 🗃 🗃 🕻 | 3 4 1 | 6 🖻 🛍 | ⁄疆)) | = *≣ ≠° | 8 號 📇 🔹 | $\downarrow \rightarrow -$ | + 🗸 🖂 | ≜ ↓ Z ↓ 🤇 | 2 | | | | |
| | Study name | Drug Improved | Drug Total N | Control Improved | Control Total N | Risk ratio | Log risk ratio | Std Err | Variance | Drug | к | L | м | N | O |
| | 1 Becher, 2002 | 51 | 66 | 22 | 65 | 2.283 | 0.826 | 0.186 | 0.035 | Viagra | | | | | |
| | 2 Chen, 2001 | 97 | 110 | 43 | 111 | 2.276 | 0.823 | 0.124 | 0.015 | Viagra | | | | | |
| | 3 Choi, 2003 | 58 | 66 | 25 | 65 | 2.285 | 0.826 | 0.163 | 0.027 | Viagra | | | | | |
| | 4 Christiansen, 2000 | 79 | 96 | 27 | 105 | 3.200 | 1.163 | 0.172 | 0.030 | Viagra | | | | | |
| | 5 Dinsmore, 1999 | 46 | 57 | 10 | 54 | 4.358 | 1.472 | 0.293 | 0.086 | Viagra | | | | | |
| | 6 Glina, 2001 | 100 | 124 | 43 | 121 | 2.269 | 0.819 | 0.130 | 0.017 | Viagra | | | | | |
| | 7 Goldstein, 1998 | 217 | 302 | 50 | 200 | 2.874 | 1.056 | 0.128 | 0.016 | Viagra | | | | | |

- For the drug group, nearly 80% of the patients (51/66) improved.
- For the control group, only about 33% (22/65) improved.

Clearly, the treated group did better, and the risk ratio (2.283) is greater than one. This tells us that we are interpreting the direction of the effect size properly.

To run the analysis, click [Run analysis]

| | + Comprehensive meta | a analysis - [C | :\Users\Bio | ostat\Dropb | ox\Worksho | ops Three-D | ay\Erectile D | ysfunction\\ | Viagra Leviti | ra Cialis.cma |] | | | | |
|---|-----------------------------|---------------------|--------------------|---------------------|--------------------|-------------|-------------------|----------------------------|---------------|-------------------------|---|---|---|---|---|
| | <u>File Edit Format Vie</u> | w <u>I</u> nsert Id | entify <u>T</u> oo | ols Comput | tational opt | ions Analy | ses <u>H</u> elp | | | | | | | | |
| | Run analyses 🔸 🗞 [|) 🚔 🚟 🕻 | 3 😂 X | h 🖻 | <u>ا ا ای</u> | '= *≣ ⊀ | 8 tas 🖬 👻 | $\downarrow \rightarrow -$ | ⊢ ✓ 🗆 | ≜ ↓ Z ↓ 🤇 | > | | | | |
| 4 | Study name | Drug Improved | Drug Total N | Control Improved | Control Total N | Risk ratio | Log risk ratio | Std Err | Variance | Drug | к | L | м | N | 0 |
| | 1 Becher, 2002 | 51 | 66 | 22 | 65 | 2.283 | 0.826 | 0.186 | 0.035 | Viagra | | | | | |
| | 2 Chen, 2001 | 97 | 110 | 43 | 111 | 2.276 | 0.823 | 0.124 | 0.015 | Viagra | | | | | |
| | 3 Choi, 2003 | 58 | 66 | 25 | 65 | 2.285 | 0.826 | 0.163 | 0.027 | Viagra | | | | | |
| | 4 Christiansen, 2000 | 79 | 96 | 27 | 105 | 3.200 | 1.163 | 0.172 | 0.030 | Viagra | | | | | |
| | 5 Dinsmore, 1999 | 46 | 57 | 10 | 54 | 4.358 | 1.472 | 0.293 | 0.086 | Viagra | | | | | |
| | 6 Glina, 2001 | 100 | 124 | 43 | 121 | 2.269 | 0.819 | 0.130 | 0.017 | Viagra | | | | | |
| | 7 Goldstein, 1998 | 217 | 302 | 50 | 200 | 2.874 | 1.056 | 0.128 | 0.016 | Viagra | | | | | |
| | 8 Gomez, 2002 | 58 | 76 | 38 | 82 | 1.647 | 0.499 | 0.135 | 0.018 | Viagra | | | | | |
| | 9 Heiman at al, 2007 | 59 | 85 | 23 | 91 | 2.746 | 1.010 | 0.194 | 0.038 | Viagra | | | | | |
| | 10 Jones, 2008 | 78 | 103 | 36 | 99 | 2.083 | 0.734 | 0.144 | 0.021 | Viagra | | | | | |
| | 11 Kadioglu, 2008 | 131 | 147 | 63 | 147 | 2.079 | 0.732 | 0.100 | 0.010 | Viagra | | | | | |
| | 12 Kongkanand, 2003 | 52 | 63 | 22 | 62 | 2.326 | 0.844 | 0.181 | 0.033 | Viagra | | | | | |
| | 13 Levinson, 2003 | 95 | 128 | 34 | 126 | 2.750 | 1.012 | 0.156 | 0.024 | Viagra | | | | | |

This is the basic analysis screen

Initially, the program displays the fixed-effect analysis. This is indicated by the tab at the bottom and the label in the plot.

| Comprehen | sive meta analysis - [A | nalysis] | | | | | - | | | | | | |
|------------------------------|----------------------------|----------------|----------------|------------------|-----------------|----------------|--------------|------|------------------|---------------|--------|------------------|--|
| le <u>E</u> dit F <u>o</u> r | mat <u>V</u> iew Computat | tional options | Analyses | <u>H</u> elp | | | | | | | | | |
| Data entry | t⊒ Next table | 🛨 High re | esolution plot | E Select | by 🕇 🕇 E | Effect measure | : Risk ratio | • | | 11 # E | 🖓 🖞 📕 | | |
| Model | Study name | | Stati | stics for each : | study | | | Ri | sk ratio and 95% | : CI | | Weight (Fixed) | |
| | | Bisk ratio | Lower limit | Lloper limit | 7.Value | o.Value | 0.01 | 0.10 | 1.00 | 10.00 | 100.00 | Relative weight | |
| | | Thek Iduo | Lower mint | oppor minic | 2.4 dius | p.value | 0.01 | 0.10 | 1.00 | 10.00 | 100.00 | Trelative weight | |
| Ch | ien, 2001 | 2.276 | 1.784 | 2.905 | 6.614 | 0.000 | | | + | | | 3.57 | |
| - Ch | ioi, 2003 | 2.285 | 1.659 | 3.147 | 5.056 | 0.000 | | | | | | 2.07 | |
| Uh Di | ristiansen, 2000 | 3.200 | 2.282 | 4.488 | 6.743 | 0.000 | | | -+ | - | | 1.85 | |
| Dir | nsmore, 1999 | 4.358 | 2.455 | 7.734 | 5.029 | 0.000 | | | - | + | | 0.64 | |
| Gli | na, 2001 | 2.269 | 1.759 | 2.928 | 6.299 | 0.000 | | | + | | | 3.26 | |
| Go | oldstein, 1998 | 2.874 | 2.238 | 3.691 | 8.270 | 0.000 | | | + | | | 3.39 | |
| Go | omez, 2002 | 1.647 | 1.264 | 2.145 | 3.697 | 0.000 | | | + | | | 3.03 | |
| He | eiman at al, 2007 | 2.746 | 1.877 | 4.018 | 5.205 | 0.000 | | | | - | | 1.46 | |
| Jor | nes, 2008 | 2.083 | 1.570 | 2.763 | 5.088 | 0.000 | | | +- | | | 2.65 | |
| Ka | dioglu, 2008 | 2.079 | 1.711 | 2.527 | 7.357 | 0.000 | | | + | | | 5.57 | |
| Ko | ngkanand, 2003 | 2.326 | 1.632 | 3.315 | 4.670 | 0.000 | | | | | | 1.69 | |
| Le | vinson, 2003 | 2.750 | 2.028 | 3.731 | 6.505 | 0.000 | | | -+ | | | 2.28 | |
| Me | euleman, 2001 | 3.253 | 2.440 | 4.338 | 8.035 | 0.000 | | | → | - | | 2.56 | |
| Mo | ontorsi, 1999 | 3.260 | 2.373 | 4.478 | 7.296 | 0.000 | | | → | - | | 2.10 | |
| Ols | sson, 2000 | 2.020 | 1.548 | 2.637 | 5.178 | 0.000 | | | -+ | | | 2.99 | |
| Pa | idma-Nathan, 1998 | 3.810 | 2.606 | 5.570 | 6.903 | 0.000 | | | - | | | 1.47 | |
| Ta | n, 2000 | 2.638 | 2.029 | 3.429 | 7.248 | 0.000 | | | -+ | | | 3.08 | |
| Yo | ung, 2002 | 2.326 | 1.901 | 2.844 | 8.216 | 0.000 | | | + | | | 5.23 | |
| Ca | rson, 2004 | 4.096 | 2.913 | 5.760 | 8.108 | 0.000 | | | - | +- | | 1.82 | |
| Ed | lwards, 2006 | 2.105 | 1.522 | 2.913 | 4.494 | 0.000 | | | | | | 2.01 | |
| Ha | atzichristou, 2004 | 2.408 | 1.855 | 3.125 | 6.605 | 0.000 | | | | | | 3.12 | |
| He | ellstrom, 2002 | 3.123 | 2.312 | 4.218 | 7.423 | 0.000 | | | - | - | | 2.35 | |
| Ma | artin-Morales, 2007 | 2.321 | 1.682 | 3.203 | 5.126 | 0.000 | | | | | | 2.04 | |
| Na | agao, 2004 | 2.321 | 1.682 | 3.203 | 5.126 | 0.000 | | | | | | 2.04 | |
| Po | rst 2001 | 2 469 | 1 893 | 3 222 | 6.661 | 0.000 | | | - | | | 3.00 | |
| Ba | anh 2007 | 3.053 | 2.330 | 4 001 | 8.091 | 0.000 | | | -+ | - | | 2.90 | |
| Ta | n 2008 | 3 369 | 2 219 | 5 115 | 5 702 | 0.000 | | | | _ | | 1.22 | |
| Va | liquette 2005 | 2 502 | 2 074 | 3.020 | 9.567 | 0.000 | | | + | | | 6.00 | |
| Га Га | rrier 2005 | 3 314 | 1 953 | 5.622 | 4 442 | 0.000 | | | | _ | | 0.76 | |
| Ca | rson 2005 | 5.035 | 2 5 2 1 | 10.056 | 4 580 | 0.000 | | | _ | - | | 0.44 | |
| Ca Ch | en 2004 | 1.622 | 1 290 | 2 029 | 4 1 4 2 | 0.000 | | | + | | | 4 05 | |
| Ch | oi 2006 | 1.022 | 1.250 | 2,000 | 3 240 | 0.000 | | | | | | 1.61 | |
| Fa | rdleu 2004 | 3,609 | 2129 | 6.093 | 4 805 | 0.001 | | | | - I | | 0.77 | |
| Gu | in 2006 | 1 901 | 1 5/2 | 2 344 | 6.010 | 0.000 | | | + | | | 4.83 | |
| uu Ma | Mahon 2005 | 6 102 | 2,966 | 12 994 | 100.0 | 0.000 | | | | | | 0.37 | |
| M - | ananon, 2000 arao, 2006 | 2 565 | 2.000 | 3 500 | 5,004 | 0.000 | | | | · | | 2.09 | |
| D a | igao, 2000 sifer 2007 | 2.363 | 1,000 | 3,714 | 5.004 | 0.000 | | | | . | | 1.65 | |
| na C. | apron, 2007 Julan, 2000 | 1.000 | 1.010 | 0.714 | 0.220 | 0.000 | | | | | | 1.00 | |
| 5a, | iyian, 2006 Asl. 2004 | 1.936 | 1.266 | 2.361 | 3.043 | 0.002 | | | | | | 1.10 | |
| 50 | atter, 2004 | 4.231 | 2.344 | 7.636 | 4.788 | 0.000 | | | | | | 0.61 | |
| 58 | .oumai, 2004 - 0000 | 2.628 | 1.387 | 3.4/5 | 6.//5 C 17C | 0.000 | | | | | | 2.71 | |
| - 4 | 006 | 2.861 | 2.049 | 3.333 | 6.176 00.001 | 0.000 | | | -+ | | | 1.91 | |
| ed | | 2.461 | 2.350 | 2.577 | 38.331 | 0.000 | | | 1 | | | | |
| ed Rando | m Both models | | | | | | | | | | | | |

Dasic stats one study removed Cumulative analysis Calculations

Every one of the studies has a risk ratio over 1.0, which means that the treated group did better than the control. In fact, the effect is statistically significant in every one of the studies.

The pooled effect is 2.461, which means that patients treated with the drug were almost 2.5 times more likely to report improvement as compared with those treated with placebo.

There is substantial variation in the observed effects. We'll need to see what proportion of this may be attributed to sampling error, and what proportion is real.

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Viagra Levitra Cialis

— 18 —

Click [Both models]

The program displays results for both the fixed-effect and the random-effects analysis.

| Data entry | t⊒ Next table | 井 High re | solution plot | Generation Select | by + E | ffect measure: I | Risk ratio | - | | 0 | | |
|------------|---------------------|------------|---------------|-------------------|---------|------------------|------------|-------|------------------|--------|-----------------|-------------------|
| Model | Studu name | ++ | Statis | tics for each : | studu | | | Biek | ratio and 95% Cl | | Weight (Fived) | Weight (Bandom) |
| Model | Study Hame | | Judua | | , ady | | | 1 Hor | Tatio and 55% Cr | | weight (nixed) | weight (Handolin) |
| | | Risk ratio | Lower limit | Upper limit | Z-Value | p-Value | 0.01 | 0.10 | 1.00 10.00 | 100.00 | Relative weight | Relative weight |
| Ch | noi, 2003 | 2.285 | 1.659 | 3.147 | 5.056 | 0.000 | 1 | | + | | 2.07 | 2.41 |
| Ch | nristiansen, 2000 | 3.200 | 2.282 | 4.488 | 6.743 | 0.000 | | | | | 1.85 | 2.29 |
| Di | nsmore, 1999 | 4.358 | 2.455 | 7.734 | 5.029 | 0.000 | | | | | 0.64 | 1.18 📕 |
| Gi | ina, 2001 | 2.269 | 1.759 | 2.928 | 6.299 | 0.000 | | | + | | 3.26 | 2.92 |
| Go | oldstein, 1998 | 2.874 | 2.238 | 3.691 | 8.270 | 0.000 | | | + | | 3.39 | 2.96 |
| Go | omez, 2002 | 1.647 | 1.264 | 2.145 | 3.697 | 0.000 | | | + | | 3.03 | 2.84 |
| He | eiman at al, 2007 | 2.746 | 1.877 | 4.018 | 5.205 | 0.000 | | | | | 1.46 | 2.02 |
| Jo | nes, 2008 | 2.083 | 1.570 | 2.763 | 5.088 | 0.000 | | | + | | 2.65 | 2.69 |
| Ka | adioglu, 2008 | 2.079 | 1.711 | 2.527 | 7.357 | 0.000 | | | + | | 5.57 | 3.43 |
| Ke | ongkanand, 2003 | 2.326 | 1.632 | 3.315 | 4.670 | 0.000 | | | | | 1.69 | 2.18 |
| Le | vinson, 2003 | 2.750 | 2.028 | 3.731 | 6.505 | 0.000 | | | | | 2.28 | 2.53 |
| Me | euleman, 2001 | 3.253 | 2.440 | 4.338 | 8.035 | 0.000 | | | | | 2.56 | 2.65 |
| Me | ontorsi, 1999 | 3.260 | 2.373 | 4.478 | 7.296 | 0.000 | | | | | 2.10 | 2.43 |
| 01 | sson, 2000 | 2.020 | 1.548 | 2.637 | 5.178 | 0.000 | | | + | | 2.99 | 2.82 |
| Pa | adma-Nathan, 1998 | 3,810 | 2.606 | 5.570 | 6.903 | 0.000 | | | | | 1.47 | 2.03 |
| Ta | an. 2000 | 2.638 | 2.029 | 3.429 | 7.248 | 0.000 | | | -+ | | 3.08 | 2.86 |
| Yo | ouna, 2002 | 2.326 | 1.901 | 2.844 | 8.216 | 0.000 | | | + | | 5.23 | 3.37 |
| Ca | arson, 2004 | 4.096 | 2.913 | 5.760 | 8.108 | 0.000 | | | | | 1.82 | 2.27 |
| Ec | dwards, 2006 | 2.105 | 1.522 | 2.913 | 4.494 | 0.000 | | | - | | 2.01 | 2.38 |
| Ha | atzichristou, 2004 | 2,408 | 1.855 | 3.125 | 6.605 | 0.000 | | | + | | 3.12 | 2.87 |
| He | ellstrom, 2002 | 3.123 | 2.312 | 4,218 | 7.423 | 0.000 | | | | | 2.35 | 2.56 |
| Ma | artin-Morales, 2007 | 2.321 | 1.682 | 3.203 | 5.126 | 0.000 | | | | | 2.04 | 2.40 |
| Na | agao, 2004 | 2.321 | 1.682 | 3.203 | 5.126 | 0.000 | | | | | 2.04 | 2.40 |
| Po | arst, 2001 | 2.469 | 1.893 | 3.222 | 6.661 | 0.000 | | | + | | 3.00 | 2.83 |
| Ba | alph, 2007 | 3.053 | 2.330 | 4.001 | 8.091 | 0.000 | | | | | 2.90 | 2.79 |
| Ta | an, 2008 | 3,369 | 2.219 | 5.115 | 5.702 | 0.000 | | | | | 1.22 | 1.82 |
| Va | aliquette, 2005 | 2.502 | 2.074 | 3.020 | 9.567 | 0.000 | | | + | | 6.00 | 3.49 |
| Ca | arrier, 2005 | 3.314 | 1.953 | 5.622 | 4.442 | 0.000 | | | | | 0.76 | 1.33 |
| Ca | arson, 2005 | 5.035 | 2.521 | 10.056 | 4.580 | 0.000 | | | | | 0.44 | 0.89 |
| Ch | ien, 2004 | 1.622 | 1.290 | 2.039 | 4.142 | 0.000 | | | + | | 4.05 | 3.14 |
| Ch | noi, 2006 | 1.822 | 1.268 | 2.620 | 3.240 | 0.001 | | | | | 1.61 | 2.13 |
| Ea | ardley, 2004 | 3.609 | 2.138 | 6.093 | 4.805 | 0.000 | | | | | 0.77 | 1.35 |
| նւ | uo, 2006 | 1.901 | 1.542 | 2.344 | 6.010 | 0.000 | | | + | | 4.83 | 3.30 |
| Me | cMahon, 2005 | 6.103 | 2.866 | 12.994 | 4.691 | 0.000 | | | | | 0.37 | 0.77 |
| Na | agao, 2006 | 2.565 | 1.866 | 3.526 | 5.804 | 0.000 | | | | | 2.09 | 2.43 |
| Ra | ajifer, 2007 | 2.597 | 1.815 | 3.714 | 5.225 | 0.000 | | | | | 1.65 | 2.16 |
| Sa | aylan, 2006 | 1.936 | 1.266 | 2.961 | 3.049 | 0.002 | | | | | 1.18 | 1.78 |
| Se | aftel, 2004 | 4.231 | 2.344 | 7.636 | 4.788 | 0.000 | | | | | 0.61 | 1.13 |
| 01 | | 2.628 | 1.987 | 3.475 | 6.775 | 0.000 | | | -+- | | 2.71 | 2.72 |
| Yip | p, 2006 | 2.861 | 2.049 | 3.993 | 6.176 | 0.000 | | | | | 1.91 | 2.32 |
| ed 🧷 | | 2.461 | 2.350 | 2.577 | 38.331 | 0.000 | | | + | | | |
| andom | | 2.550 | 2.372 | 2742 | 25 299 | 0.000 | | | | | | |

Under the fixed-effect model the pooled effect size is 2.461, while under the random-effects model the pooled effect size is 2.550. While the two models yield very similar results, the random-effects model is a better fit for the way the studies were sampled, and therefore that is the model we will use in the analysis.

- The fixed-effect model would be appropriate if all the studies were virtual replicates of each other, which is not the case here. The dose varied, the analgesic varied, the patients varied.
- The random-effects model would be appropriate if the studies vary in ways that may impact the effect size (such as those mentioned immediately above). Therefore, we will use the random-effects model.

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Viagra Levitra Cialis

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• Click Random on the tab at the bottom

The plot now displays the random-effects analysis alone.

| | | | | | | | | ſ | | | |
|-----------|--|------------|---------------|-----------------|----------------|---------------|------------|------|--------------------|------------|-----------------|
| entry | 1 + Next table | + High re | solution plot | Le Select | by + E | ffect measure | Risk ratio | • | | E -E 3 🖓 | 5 |
| | Study name | | Statis | tics for each : | study | | | Ris | k ratio and 95% Cl | | Weight (Random) |
| | | Risk ratio | Lower limit | Upper limit | Z-Value | p-Value | 0.01 | 0.10 | 1.00 10.0 | 0 100.00 | Relative weight |
| Ch | en, 2001 | 2.276 | 1.784 | 2.905 | 6.614 | 0.000 | | | + | | 3.01 |
| Ch | oi, 2003 | 2.285 | 1.659 | 3.147 | 5.056 | 0.000 | | | | | 2.41 |
| Ch | ristiansen, 2000 | 3.200 | 2.282 | 4.488 | 6.743 | 0.000 | | | | | 2.29 |
| Dir | nsmore, 1999 | 4.358 | 2.455 | 7.734 | 5.029 | 0.000 | | | | | 1.18 |
| Gli | na, 2001 | 2.269 | 1.759 | 2.928 | 6.299 | 0.000 | | | + | | 2.92 |
| Go | ldstein, 1998 | 2.874 | 2.238 | 3.691 | 8.270 | 0.000 | | | + | | 2.96 |
| Go | mez, 2002 | 1.647 | 1.264 | 2.145 | 3.697 | 0.000 | | | + | | 2.84 |
| He | iman at al, 2007 | 2.746 | 1.877 | 4.018 | 5.205 | 0.000 | | | | | 2.02 |
| Jor | nes, 2008 | 2.083 | 1.570 | 2.763 | 5.088 | 0.000 | | | + | | 2.69 |
| Ka | dioalu. 2008 | 2.079 | 1.711 | 2.527 | 7.357 | 0.000 | | | + | | 3.43 |
| Ko | nokanand. 2003 | 2.326 | 1.632 | 3.315 | 4.670 | 0.000 | | | | | 2.18 |
| Le | vinson 2003 | 2.750 | 2.028 | 3,731 | 6.505 | 0.000 | | | | | 2.53 |
| Me | uleman 2001 | 3 253 | 2 440 | 4 338 | 8.035 | 0.000 | | | | | 2.65 |
| Me | intorsi 1999 | 3 260 | 2 373 | 4 478 | 7 296 | 0.000 | | | | | 2.43 |
| n k | :son 2000 | 2 020 | 1.548 | 2.637 | 5 1 7 8 | 0.000 | | | | | 2.82 |
| Pa | dma-Nathan 1998 | 3.810 | 2,606 | 5 570 | 6 903 | 0.000 | | | | | 2.02 |
| Ta | n 2000 | 2,638 | 2.000 | 3 4 2 9 | 7 248 | 0.000 | | | <u>+</u> | | 2.86 |
| - Yo | upa 2002 | 2.000 | 1 901 | 2.944 | 8.216 | 0.000 | | | | | 3.37 |
| Ca | rson 2004 | 4.096 | 2 913 | 5 760 | 8 108 | 0.000 | | | - | | 2.27 |
| Ed | warde 2006 | 2.105 | 1 522 | 2 913 | 4 494 | 0.000 | | | | | 2.38 |
| | trichristov, 2004 | 2.103 | 1.522 | 2.313 | 4.434 6.605 | 0.000 | | | | | 2.30 |
| Ha | llatrom 2002 | 2.400 | 2 212 | 4 210 | 7 422 | 0.000 | | | | | 2.07 |
| M- | usuom, 2002 utin Morales, 2007 | 2 221 | 1 602 | 9.210 | 7.42J E 100 | 0.000 | | | | | 2.30 |
| Me. | ana 2004 | 2.321 | 1.002 | 3.203 | 5.120 | 0.000 | | | | | 2.40 |
| D- | igao, 2004 rot. 2001 | 2.321 | 1.002 | 3.203 | 0.126 | 0.000 | | | | | 2.40 |
| г0 Б- | 181, 2001 Job 2007 | 2.463 | 1.033 | 3.222 | 0.001 | 0.000 | | | | | 2.03 |
| na T- | ipn, 2007 | 3.003 | 2.030 | 4.001 | 0.031 E 700 | 0.000 | | | | | 2.73 |
| 1a 1/- | n, 2006 Kauatta, 2005 | 3.369 | 2.219 | 0.115 | 0.702 | 0.000 | | | | | 2.40 |
| va C- | ilquette, 2000 | 2.002 | 2.0/4 | 3.020 | 3.367 | 0.000 | | | — | | 3.43 |
| C- | mer, 2003 roop, 2005 | 5.014 | 1.303 | 10.052 | 4.442 | 0.000 | | | | | 1.33 |
| La CL | ISUN, 2000 | 1.035 | 2.521 | 10.006 | 4.580 | 0.000 | | | | | 0.69 |
| Ch | en, 2004 | 1.022 | 1.290 | 2.039 | 4.142 | 0.000 | | | | | 3.14 |
| Un E- | ui, 2006 uileu: 2004 | 1.822 | 1.268 | 2.620 | 3.240 | 0.001 | | | I | | 2.13 |
| E a | ruley, 2004 | 3.609 | 2.138 | 5.093 | 4.805 | 0.000 | | | | | 1.33 |
| uu | 0,2006 Mahan 2005 | 0.100 | 1.942 | 2.344 | 6.010 | 0.000 | | | ⁺ . | | 3.30 |
| MO | manon, 2005 | 0.103 | 2.866 | 12.994 | 4.691 | 0.000 | | | | | 0.77 |
| Na | gao, 2006 ::: | 2.565 | 1.866 | 3.526 | 5.804 | 0.000 | | | | | 2.43 |
| Ha | (irer, 2007 | 2.59/ | 1.815 | 3.714 | 5.225 | 0.000 | | | | | 2.16 |
| 5a | yian, ∠UU6 0. I. 2004 | 1.936 | 1.266 | 2.961 | 3.049 | 0.002 | | | | | 1.78 |
| Se | Itel, 2004 | 4.231 | 2.344 | 7.636 | 4.788 | 0.000 | | | | | 1.13 |
| Sk | oumal, 2004 | 2.628 | 1.987 | 3.475 | 6.775 | 0.000 | | | + | | 2.72 |
| -¥., | , 1006 Г. П. С. | 2.861 | 2.049 | 3.993 | 6.176 | 0.000 | | | + | | 2.32 |

Basic stats Une study removed Cumulative analysis Calculations

A quick view of the plot suggests the following

- Drug was better than placebo in every study.
- This effect is statistically significant in every study.
- The risk ratios vary from a low of 1.6 to a high of 6.1
- The summary effect is 2.550 with a CI of 2.372 to 2.742. Thus, we have a pretty precise estimate of the mean effect size.
- The summary effect has a Z-value 25.299 a *p*-value of < 0.001. Thus we can reject the null hypotheses that the true risk ratio is 1.0.

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Click [Next table] Click here 🕂 Comprehensive meta analysis - [Analysis Eile Edit Format View Computational options Analyses Help + High resolution plot 🛛 🖶 Select by ... 🕇 + Effect measure: Risk ratio · 🗏 🗌 🏥 🚺 🏦 🚺 🕹 Data entry Next table Model Effect size and 95% interval Test of null (2-Tail) Heterogeneity Tau-squared Number Studies Lower limit Upper Standard Model P-value df (Q) P-value 2.461 2.550 2.350 2.372 Fixed 42 42 2 577 38.331 0.000 93.736 41 0.000 56.260 0.030 0.012 0.000 0.173 2.742 Randon 25.299 0.000

Figure 1

The statistics at the left duplicate those we saw on the prior screen.

- Under the random-effects model the risk ratio is 2.550 with a 95% confidence interval of 2.372 to 2.577. The test of the null (that the true risk ratio is 1.0) yields a Z-value of 25.299 and a corresponding p-value of < 0.001.
- The statistics at the upper right relate to the dispersion of effect sizes across studies.
- The Q-value is 93.736 with df=41 and p< 0.001. Q reflects the distance of each study from the mean effect (weighted, squared, and summed over all studies). Q is always computed using FE weights (which is the reason it is displayed on the "Fixed" row, but applies to both FE and RE analyses.</p>
- If all studies actually shared the same true effect size, the expected value of Q would be equal to
 df (which is 41). Here, Q is greater than that value, and so there is some evidence of variance in
 true effects. This excess variance falls outside the range that could be attributed to random
 variation in effects (it is statistically significant).
- We had planned to use the random-effects model, since this matches the sampling frame for the studies, and would do so whether or not the Q-value was statistically significant.
- T² is the estimate of the between-study variance in true effects. This estimate is 0.030. T is the estimate of the between-study standard deviation in true effects. This estimate is 0.173. These value are both in log units.
- *I*² reflects the proportion of true variance to observed variance. This is 56.26, which tells us that about 56% of the observed variance in effects is real. Put another way, if we were looking at a plot of the true effects rather than the observed effects, the variance in effects would be decreased by (1 minus .56) some 44%.

We can use the spreadsheet [Prediction intervals] as follows

- Open the spreadsheet [Prediction Intervals.xls]
- Select the tab for [Ratios]
- In CMA select Log risk ratio as the index
- Copy the A|B|C|D values as shown from CMA to Excel

| Eile <u>E</u> dit F <u>o</u> rm | nat <u>V</u> iew Computational | options Anal | /ses <u>H</u> elp | (| | | | | | | | | | | | |
|---------------------------------|--------------------------------|--------------------|-------------------|----------------|----------------|-----------------|------------------|----------------|----------|--------|---------|-----------|----------------|-------------------|----------|-------|
| Data entry | t [,] Next table ‡ | High resolution | plot 🔁 S | Select by | + Effect m | easure: Log ris | sk ratio 🔹 | | II ≇ E ₹ | 0 1 | | | | | | |
| Model | | Eff | ect size and | l 95% confi | dence interv | al | Test of nu | ıll (2-Tail) | | Hetero | geneity | | | Tau-s | quared | |
| Model | Number Studies | Point estimate | Standard error | Variance | Lower limit | Upper limit | Z-value | P-value | Q-value | df (Q) | P-value | l-squared | Tau Squared | Standard Error | Variance | Tau |
| Fixed Random | 4 | 2 0.900 2 0.936 | 0.023 0.037 | 0.001 0.001 | 0.854 0.864 | 0.946 1.009 | 38.331 25.299 | 0.000 0.000 | 93.736 | 41 | 0.000 | 56.260 | 0.030 | 0.012 | 0.000 | 0.173 |
| | | | в | | ר | | | | | | | | | ר | | |

Figure 2

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| XII . | 5 - | ¢~ ∓ | | | Pr | ediction interva | ls.xlsx - Ex | cel | | | |
|-------|----------------|---------------------------------|---------------------------|--------------|-----------|------------------|--------------|-----|---|---|---|
| FILE | HOME | INSERT PAGE L | AYOUT FORMULAS | DATA REVIEW | VIEW ACRO | OBAT | | | | | |
| N9 | Ŧ | \therefore \checkmark f_x | | | | | | | | | |
| A | | | В | | С | D | Е | F | G | Н | I |
| 1 | | F | Prediction interval | s for OR, RR | , HR | | | | | | |
| 2 | | | | | | | | | | | |
| 3 | En | ter values in shaded (| cells only | | | | | | | | |
| 4 | Va | lues must be entered | in log units | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | Nu | mber of studies | | | 41 | | | A | | | |
| 7 | De | grees of freedom | | | 39 | p. 130 | | | | | |
| 8 | Cri | tical value for t (95% | interval) | | 2.022691 | p. 131 | | | | | |
| 9 | Me | ean effect (random ef | fect weights) in log unit | s | 0.936000 | 12.7 | | В | | | |
| 10 | Та | u-squared in log units | ; | | 0.030000 | 16.5 | | С | | | |
| 11 | Va | riance of <i>M</i> * in log u | nits | | 0.001000 | 12.8 | | D | | | |
| 12 | | | | | | | | | | | |
| 13 | Pre | ediction interval in log | g units | | | | | | | | |
| 14 | Me | an | | | 0.936000 | | | | | | |
| 15 | Pre | ediction interval (95% |) lower limit | | 0.579869 | 17.7 | | | | | |
| 16 | Pre | ediction interval (95% |) upper limit | | 1.292131 | 17.8 | | | | | |
| 17 | | | | | | | | | | | |
| 18 | Pre | ediction interval in rat | io units | | | | | | | | |
| 19 | Me | ean | | | 2.549762 | | | | | | |
| 20 | Pre | ediction interval (95% |) lower limit | | 1.785804 | | | | | | |
| 21 | Pre | ediction interval (95% |) upper limit | | 3.640538 | | | | | | |
| 22 | | | | | | | | | | | |
| | | | | | | | | | | | |

The confidence interval is 2.372 to 2.742 (we need to read this from Figure 1, where the index is the risk ratio, and not from Figure 2 where the index is the log risk ratio). The prediction interval (from Excel) is 1.785 to 3.641.

In 95% of all possible meta-analyses, the true <u>mean</u> will fall in the range indicated by the CI (2.372 to 2.742). In 95% of all meta-analyses, the true effect size for 95% <u>of all studies</u> will fall inside the range indicated by the PI (1.785 to 3.641). This assumes that the true effect sizes are normally distributed.

Click [Next table] to return to the main analysis screen.

To this point we've established that drug is effective, but that the magnitude of the effect varied from study to study. We know that some studies used Viagra, others used Levitra, and others used Cialis. We'd like to see if the effect was stronger in one subgroup of studies than another.

When we're dividing the studies into subgroups, the between-studies variance (T^2) must be computed within subgroups. However, we have two options. We can then pool the separate estimates, and use the pooled value for all subgroups. Or, we can use a separate estimate for each subgroup.

Our plan is to pool the estimates. To select that option

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Click Computational options > Mixed and random effects options

| 🕂 Compre | hensive meta ar | nalysis - [An | alysis] | | - | | in the Car | | - | | | 10.1 | off Tables | |
|---------------------------|------------------------------|----------------|-----------------|----------------------|-------|----------------|----------------|---------------|------|-------------------|----------|------|-----------------|--|
| <u>F</u> ile <u>E</u> dit | F <u>o</u> rmat <u>V</u> iew | Computati | ional options A | nalyses <u>H</u> elp | | | | | | | | | | |
| ← Data ent | try t⊒ Ne | + Effect | measure | | elect | by 🕇 🕂 E | Effect measure | e: Risk ratio | • | | ± E ₹ | 🖓 🕻 | | |
| Model | Study r | [] CI Lev | el 95% | | each | studv | | | Bia | k ratio and 95% C | | | Weight (Bandom) | |
| | | 🔁 Select | by | | | | | | | | | | | |
| | | 📑 Group | by | | limit | Z-Value | p-Value | 0.01 | 0.10 | 1.00 | 10.00 10 | 0.00 | Relative weight | |
| | Chen, 2001 | Comp | are groups | | 2.905 | 6.614 | 0.000 | | | + | | | 3.01 | |
| 1 | Christiansen 20 | D Mixed | and random eff | ects options | A.488 | 5.055 6.743 | 0.000 | | | | | | 2.29 | |
| 1 | Dinsmore, 1999 | | 4.358 | 2.455 | 7.734 | 5.029 | 0.000 | | | | - | | 1.18 | |
| | Glina, 2001 📞 | | 2.269 | 1.759 | 2.928 | 6.299 | 0.000 | | | + | | | 2.92 | |
| 1 | Goldstein, 1998 | | 2.874 | 2.238 | 3.691 | 8.270 | 0.000 | | | + | | | 2.96 | |
| 1 | Gomez, 2002 | | 1.647 | 1.264 | 2.145 | 3.697 | 0.000 | | | -+ | | | 2.84 | |
| I | Heiman at al. 20 | 107 | 2 746 | 1 877 | 4 018 | 5 205 | 0 000 | | | | | 1 | 2 N2 💻 | |

The program displays this wizard

- At the top select the first option, to "Assume a common among-study variance"
- At the bottom select the first option, to "Combine subgroups using a fixed-effect model"

| 🕂 Comprehensive meta analysis - | - [Analysis] | |
|--|---|-------------|
| <u>File Edit Format View</u> Comput | utational options Analyses <u>H</u> elp | |
| ← Data entry tit Next table | 掛 High resolution plot 🛛 🖶 Select by 🕇 🛨 Effect measure: Risk ratio 💦 🗐 🛄 🗒 👯 👯 🗜 🗜 🏌 👔 | |
| Model Study name | Statistics for each study Risk ratio and 95% CI Weight | (Random) |
| | Risk ratio Lower limit Upper limit Z-Value p-Value 0.01 0.10 1.00 10.00 Relati | ve weight |
| Chen, 2001 Choi, 2003 Christiansen, 2000 Dinsmore, 1993 Gilna, 2001 Goldstein, 1998 Gomez, 2002 Heiman at al, 2007 Jones, 2008 Kadioglu, 2008 Kongkanand, 2003 Levinson, 2003 | 2.276 1.784 2.905 6.614 0.000 + 3.00 2.285 3.200 Image: State of the state of th | |
| Montorsi, 1999 Olsson, 2000 Padma-Nathan, 1998 Tan, 2000 Young, 2002 Carson, 2004 Edwards, 2006 Hatzichristou, 2004 Hellstom, 2002 Matii Macaba, 2007 | 3.260 Combining subgroups to yield an overall effect 2.4 2.020 Combining subgroups using fixed effect model 2.0 2.638 Combine subgroups using fixed effect model 2.0 2.326 Combine subgroups using random effects model 2.2 2.105 2.33 2.3 2.408 2.31 Cancel Apply 0 k 2.5 2.5 | |
| Maiuri-Morales, 2007 Nagao, 2004 Porst, 2001 Ralph, 2007 | 2.321 2.4 2.469 1.893 3.222 6.661 0.000 + 2.8 3.053 2.330 4.001 8.091 0.000 + 2.7 | 3 3 9 |

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Now, we can tell the program to run the analysis by subgroups.

Click Computational options > Group by

| Comprel | hensive meta ar | nalysis | - [Analysis] |] | | | | | 1.0 | | | | | | |
|--------------------------|--|-----------------|--------------|---------|-----------------------|-----------|----------|---------------|---------------|------|-----------------|---------------|--------|-----------------|--|
| <u>File</u> <u>E</u> dit | Format <u>V</u> iew | Comp | outational o | options | Analyses <u>H</u> elp | | | | | | | | | | |
| + Data ent | try _t구 Ne | + E | ffect measu | ire | | elect | by 🕇 H | Effect measur | e: Risk ratio | - | | 17 # E | 🗜 👌 🔍 | | |
| Model | Errorat View Computational options Anis entry t 7 Ne + Effect measure 1 Cl Level 95% Study r Colort by Compare groups Choi, 2003 Choi, 2003 Compare groups Mixed and random effect Dinsmore, 1999 4,358 Glina, 2001 2,269 | | | | | each: | study | | | Ris | k ratio and 95% | СІ | | Weight (Random) | |
| | C | <u>-</u> | elect by | | | - English | 77 | - Value | 0.01 | 0.10 | 1.00 | 10.00 | 100.00 | Deletive unidat | |
| | | 📑 G | roup by | | N | limit | Z-1 alue | p-value | 0.01 | 0.10 | 1.00 | 10.00 | 100.00 | Helative weight | |
| | Chen, 2001 | oups | 43 | 2.905 | 6.614 | 0.000 | | | | | | 3.01 | | | |
| | Christiansen, 20 | effects options | 1.488 | 6.743 | 0.000 | | | | - | | 2.29 | | | | |
| | Dinsmore, 1999 | 2.455 | 7.734 | 5.029 | 0.000 | | | | + | | 1.18 | | | | |
| | Glina, 2001 | | | 2.269 | 1.759 | 2.928 | 6.299 | 0.000 | | | | | | 2.92 | |
| | Goldstein, 1998 | | | 2.874 | 2.238 | 3.691 | 8.270 | 0.000 | | | + | | | 2.96 | |
| | Gomez, 2002 | | | 1.647 | 1.264 | 2.145 | 3.697 | 0.000 | | | -+- | | | 2.84 | |
| I | dit La entry 1 Ne + Effect measure a entry 1 Ne + Effect measure el Study r - Clevel 95% Chen, 2001 Compare groups Choistansen, 20 Compare groups Choistansen, 20 Mixed and random effect Dinsmore, 1999 2.858 Gina, 2001 2.269 Goldstein, 1998 2.874 Gomez, 2002 1.647 Heiman at al, 2007 2.746 | | | | 1.877 | 4.018 | 5.205 | 0.000 | | | | - | | 2.02 | |

- Select Drug
- Check the two boxes
- Click Ok

| 🕂 Comprei | ensive meta analysis - [/ | Analysis] | | | | | - | | | | | | |
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| Model | Study name | | Stati | stics for each s | study | | | Ris | < ratio and 95% | CI | | Weight (Random) | |
| | | Risk ratio | Lower limit | Upper limit | Z-Value | p-Value | 0.01 | 0.10 | 1.00 | 10.00 | 100.00 | Relative weight | |
| | Chen, 2001 Choi, 2003 Christiansen, 2000 | 2.276 2.285 3.200 | 1.784 1.659 2.282 | 2.905 3.147 4.488 | 6.614 5.056 6.743 | 0.000 0.000 0.000 | | | +++++++++++++++++++++++++++++++++++++++ | _ | | 3.01 2.41 2.29 | |
| | Dinsmore, 1999 Glina, 2001 Goldstein, 1998 Gomez, 2002 Heiman at al, 2007 Jones, 2008 | Run a sep | barate analy | vsis for each | level of | |) | | +++++++++++++++++++++++++++++++++++++++ | - | | 1.18 2.92 2.96 2.84 2.02 2.69 | |
| | Kadioglu, 2008 Kongkanand, 2003 Levinson, 2003 Meuleman, 2001 Montorsi, 1999 | Also run | analysis acro e effect at diff | iss levels of dri erent levels of | ug drugi | | J | | +++++++++++++++++++++++++++++++++++++++ | - - | | 3.43 2.18 2.53 2.65 2.43 | |
| | Padma-Nathan, 1998 Tan, 2000 Young, 2002 Carson, 2004 Edwards, 2006 | 2.100 | 1.922 | Cancel | R | eset | Ok | | + | + | | 2.03 2.86 3.37 2.27 | |
| | Hatzichristou, 2004 Hollokom, 2002 | 2.408 | 1.855 | 3.125 # 210 | 6.605 7.400 | 0.000 | | | + | _ | | 2.87 | |

The screen should look like this

Comprehensive meta analysis - [Analysis]

| <u>File</u> Edit | Format Vi | ew Computational options | Analyses | Help | | | | | | | | | | | |
|------------------|------------------|---------------------------|----------------|-------------|------------------|--------------|---------------|------|-----|-----------|---------------|---------|------|---------------------|---|
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| | - | | Risk ratio | Lower limit | Upper limit | Z-Value | p-Value | 0.01 | 0.1 | 0 | 1.00 1 | 0.00 10 | 0.00 | Relative weight | |
| | Cialie | Fardley, 2004 | 3 609 | 2 1 3 8 | 6.093 | 4 805 | 0.000 | 1 | | | | 1 | 1 | 5 32 | 1 |
| | Cialis | Gun 2006 | 1,901 | 1.542 | 2 344 | 6.010 | 0.000 | | | | + | | | 12.94 | |
| | Cialis | McMahon, 2005 | 6.103 | 2.866 | 12.994 | 4.691 | 0.000 | | | | | + | | 3.02 | |
| | Cialis | Nagao, 2006 | 2.565 | 1.866 | 3.526 | 5.804 | 0.000 | | | | | | | 9.54 | |
| | Cialis | Rajifer, 2007 | 2.597 | 1.815 | 3.714 | 5.225 | 0.000 | | | | | | | 8.49 | |
| | Cialis | Saylan, 2006 | 1.936 | 1.266 | 2.961 | 3.049 | 0.002 | | | | | | | 7.00 | |
| | Cialis | Seftel, 2004 | 4.231 | 2.344 | 7.636 | 4.788 | 0.000 | | | | | | | 4.47 📕 | |
| | Cialis | Skoumal, 2004 | 2.628 | 1.987 | 3.475 | 6.775 | 0.000 | | | | | | | 10.67 | |
| | Cialis | Yip, 2006 | 2.861 | 2.049 | 3.993 | 6.176 | 0.000 | | | | | | | 9.12 | |
| Random | Cialis | | 2.499 | 2.163 | 2.887 | 12.443 | 0.000 | | | | + | | | | |
| | Levitra | Carson, 2004 | 4.096 | 2.913 | 5.760 | 8.108 | 0.000 | | | | | | | 8.81 | |
| | Levitra | Edwards, 2006 | 2.105 | 1.522 | 2.913 | 4.494 | 0.000 | | | | | | | 9.24 | |
| | Levitra | Hatzichristou, 2004 | 2.408 | 1.855 | 3.125 | 6.605 | 0.000 | | | | + | | | 11.11 | |
| | Levitra | Hellstrom, 2002 | 3.123 | 2.312 | 4.218 | 7.423 | 0.000 | | | | + | | | 9.91 | |
| | Levitra | Martin-Morales, 2007 | 2.321 | 1.682 | 3.203 | 5.126 | 0.000 | | | | | | | 9.31 | |
| | Levitra | Nagao, 2004 | 2.321 | 1.682 | 3.203 | 5.126 | 0.000 | | | | | | | 9.31 | |
| | Levitra | Porst, 2001 | 2.469 | 1.893 | 3.222 | 6.661 | 0.000 | | | | + | | | 10.95 | |
| | Levitra | Halph, 2007 | 3.053 | 2.330 | 4.001 | 8.091 | 0.000 | | | | + | | | 7.05 | |
| | Levitra | Tan, 2008 Maliana 2005 | 3.369 | 2.219 | 5,115 | 5.70Z | 0.000 | | | | | | | 7.05 | |
| Dandara | Levitra | Valiquette, 2005 | 2.502 | 2.074 | 3.020 | 10 5007 | 0.000 | | | | - | | | 13.43 | |
| nariuuiii | Vipera | Rephar 2002 | 2.030 | 1 500 | 2 206 | 4 442 | 0.000 | | | | | | | 4.26 | |
| | viagra Viagra | Chen 2001 | 2.205 | 1.300 | 2 905 | 6.614 | 0.000 | | | | · - | | | 6.17 | |
| | Viagra | Choi 2003 | 2 285 | 1.659 | 3147 | 5.056 | 0.000 | | | | - | | | 4.95 | |
| | Viagra | Christiansen, 2000 | 3.200 | 2.282 | 4.488 | 6.743 | 0.000 | | | | | | | 4.70 | |
| | Viagra | Dinsmore, 1999 | 4.358 | 2.455 | 7,734 | 5.029 | 0.000 | | | | | | | 2.44 | |
| | Viagra | Glina, 2001 | 2.269 | 1.759 | 2.928 | 6.299 | 0.000 | | | | + | | | 5.98 | |
| | Viagra | Goldstein, 1998 | 2.874 | 2.238 | 3.691 | 8.270 | 0.000 | | | | + | | | 6.06 | |
| | Viagra | Gomez, 2002 | 1.647 | 1.264 | 2.145 | 3.697 | 0.000 | | | | -+- | | | 5.82 | |
| | Viagra | Heiman at al, 2007 | 2.746 | 1.877 | 4.018 | 5.205 | 0.000 | | | | | | | 4.16 | |
| | Viagra | Jones, 2008 | 2.083 | 1.570 | 2.763 | 5.088 | 0.000 | | | | + | | | 5.53 📕 | |
| | Viagra | Kadioglu, 2008 | 2.079 | 1.711 | 2.527 | 7.357 | 0.000 | | | | + | | | 7.02 | |
| | Viagra | Kongkanand, 2003 | 2.326 | 1.632 | 3.315 | 4.670 | 0.000 | | | | | | | 4.48 | |
| | Viagra | Levinson, 2003 | 2.750 | 2.028 | 3.731 | 6.505 | 0.000 | | | | - | | | 5.18 | |
| | Viagra | Meuleman, 2001 | 3.253 | 2.440 | 4.338 | 8.035 | 0.000 | | | | + | | | 5.45 | |
| | Viagra | Montorsi, 1999 | 3.260 | 2.373 | 4.478 | 7.296 | 0.000 | | | | | | | 5.00 | |
| | Viagra | Olsson, 2000 | 2.020 | 1.548 | 2.637 | 5.178 | 0.000 | | | | + | | | 5.79 | |
| | Viagra | Padma-Nathan, 1998 | 3.810 | 2.606 | 5.570 | 6.903 | 0.000 | | | | | | | 4.16 | |
| | Viagra | Tan, 2000 | 2.638 | 2.029 | 3.429 | 7.248 | 0.000 | | | | + | | | 5.86 | |
| Dandam | viagra | 1 oung, 2002 | 2.326 | 1.901 | 2.844 | 8.216 | 0.000 | | | | + | | | 6.91 | |
| Random | Viagra | | 2.507 | 2.259 | 2.783 | 17.276 | 0.000 | | | | 1 | | | | |
| | overall | | 2.001 | 2.372 | 2.744 | 23.212 | 0.000 | | | | 1 | | | | |
| Fixed Ra | indom Bo | th models | | | | | | | | | | | | | |
| Basic stat | s Calculat | ions | | | | | | | | | | | | | |

For the Cialis, Levitra, and Cialis studies, the mean risk ratio is 2.499, 2.690, and 2.507, respectively. Click the "Show individual studies" button. This will hide all of the individual studies and display the summary effects only as shown here.

| 🕂 Compre | hensive met | a analysis - [Analysis] | | | | | 1.0 | | - | - | | - | | | |
|---------------------------|-----------------------------|-------------------------|----------------|--------------|----------------|--------------|----------------|------|--------|-------------|-----------|---------|--------|---------------------|--|
| <u>F</u> ile <u>E</u> dit | F <u>o</u> rmat <u>V</u> ie | w Computational options | Analyses | <u>H</u> elp | | | | | | | | | | | |
| + Data en | itry t⊒ | Next table 🕌 High re | esolution plot | 🔁 Select | : by 🕇 🕇 | ffect measur | re: Risk ratio | | • | == II : | FE 1 | E 🚹 🔍 | 1 | | |
| Model | Group by Drug | Study name | | Stati | stics for each | study | | | Show i | ndividal st | udies 🎖 (| 3 | | Weight (Pooled tau) | |
| | | | Risk ratio | Lower limit | Upper limit | Z-Value | p-Value | 0.01 | 0.10 | 1. | 00 | 10.00 | 100.00 | Relative weight | |
| Random | Cialis | | 2.499 | 2.163 | 2.887 | 12.443 | 0.000 | | | | + | | | | |
| Random | Levitra | | 2.690 | 2.330 | 3.104 | 13.530 | 0.000 | | | | + | | | | |
| Random | Viagra | | 2.507 | 2.259 | 2.783 | 17.276 | 0.000 | | | | + | | | | |
| Random | Overall | | 2.551 | 2.372 | 2.744 | 25.212 | 0.000 | | | | н | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
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| 1 | | | | | | | | | | | | | | | |

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Not only are the three effects very close to each other, but there is substantial overlap in the confidence intervals. Therefore, the differences among the three drugs probably fall within the range that would be expected based on sampling error.

Click Next table

| a entry t⊒ Next ta | able 🏦 I | ligh resolution | plot 🛛 🔁 S | elect by | + Effect measu | re: Risk ratio | - = | | 1 ₽ € | Q 1 5 | | | | |
|--------------------|-------------------|-------------------|----------------|----------------|----------------|----------------|---------|--------|--------------|-----------|----------------|-------------------|----------|------|
| Groups | | Effect siz | e and 95% | interval | Test of nu | ıll (2-Tail) | | Hetero | geneity | | | T au-se | quared | |
| Group | Number Studies | Point estimate | Lower limit | Upper limit | Z-value | P-value | Q-value | df (Q) | P-value | l-squared | Tau Squared | Standard Error | Variance | Tau |
| Fixed effect analy | sis | | | | | | | | | | | | | |
| Cialis | 13 | 2.300 | 2.089 | 2.532 | 16.999 | 0.000 | 37.863 | 12 | 0.000 | 68.307 | 0.071 | 0.047 | 0.002 | 0.26 |
| Levitra | 10 | 2.652 | 2.425 | 2.900 | 21.377 | 0.000 | 14.117 | 9 | 0.118 | 36.248 | 0.012 | 0.016 | 0.000 | 0.11 |
| Viagra | 19 | 2.440 | 2.287 | 2.603 | 26.981 | 0.000 | 37.087 | 18 | 0.005 | 51.465 | 0.022 | 0.015 | 0.000 | 0.14 |
| Total within | | | | | | | 89.067 | 39 | 0.000 | | | | | |
| Total between | | | | | | | 4.669 | 2 | 0.097 | | | | | |
| Overall | 42 | 2.461 | 2.350 | 2.577 | 38.331 | 0.000 | 93.736 | 41 | 0.000 | 56.260 | 0.030 | 0.012 | 0.000 | 0.17 |
| Mixed effects ana | lysis | | | | | | | | | | | | | |
| Cialis | 13 | 2.499 | 2.163 | 2.887 | 12.443 | 0.000 | | | | | | | | |
| Levitra | 10 | 2.690 | 2.330 | 3.104 | 13.530 | 0.000 | | | | | | | | |
| Viagra | 19 | 2.507 | 2.259 | 2.783 | 17.276 | 0.000 | | | | | | | | |
| Total between | | | | | | | 0.708 | 2 | 0.702 | | | | | |
| Overall | 42 | 2.551 | 2.372 | 2.744 | 25.212 | 0.000 | | | | | | | | |

This screen displays two sets of statistics

The table labeled "Fixed-effect analysis" uses fixed-effect weights within subgroups. The table labeled "Mixed-effects analysis" uses random-effects weights within subgroups. This is the table we will use.

As we saw on the prior screen, the risk ratio within the three subgroups is 2.499, 2.690, and 2.507. The effect is statistically significant in each subgroup (p < 0.001).

To test the hypothesis that the effect size varies by drug we look to the line labeled "Total between". The Q-value is 0.708 with 2 df, and the corresponding p-value is 0.702. There is no evidence that the effect differs by drug.

| ta entry t⊒ Next | t table 🌐 I | High resolution | plot 🔁 S | elect by | + Effect measu | re: Risk ratio | - 🗐 | | ĭ‡E | £ 1 🗘 | | | | |
|------------------|-------------------|-------------------|----------------|----------------|----------------|----------------|-----------|--------|---------|-----------|----------------|-------------------|----------|------|
| Groups | | Effect siz | e and 95%: | interval | Test of nu | ıll (2-Tail) | \square | Hetero | geneity | | | Tau-sq | quared | |
| Group | Number Studies | Point estimate | Lower limit | Upper limit | Z-value | P-value | Q-value | df (Q) | P-value | l-squared | Tau Squared | Standard Error | Variance | Tau |
| Fixed effect ana | lysis | | | | | | | | | | | | | |
| Cialis | 13 | 2.300 | 2.089 | 2.532 | 16.999 | 0.000 | 37.863 | 12 | 0.000 | 68.307 | 0.071 | 0.047 | 0.002 | 0.26 |
| Levitra | 10 | 2.652 | 2.425 | 2.900 | 21.377 | 0.000 | 14.117 | 9 | 0.118 | 36.248 | 0.012 | 0.016 | 0.000 | 0.11 |
| Viagra | 19 | 2.440 | 2.287 | 2.603 | 26.981 | 0.000 | 37.087 | 18 | 0.005 | 51.465 | 0.022 | 0.015 | 0.000 | 0.14 |
| Total within | | | | | | | 89.067 | 39 | 0.000 | | | | | |
| Total between | | | | | | | 4.669 | 2 | 0.097 | | | | | |
| Overall | 42 | 2.461 | 2.350 | 2.577 | 38.331 | 0.000 | 93.736 | 41 | 0.000 | 56.260 | 0.030 | 0.012 | 0.000 | 0.17 |
| Mixed effects an | alysis | | | | | | | | | | | | | |
| Cialis | 13 | 2.499 | 2.163 | 2.887 | 12.443 | 0.000 | | | | | | | | |
| Levitra | 10 | 2.690 | 2.330 | 3.104 | 13.530 | 0.000 | | | | | | | | |
| Viagra | 19 | 2.507 | 2.259 | 2.783 | 17.276 | 0.000 | | | | | | | | |
| Total between | | | | | | | 0.708 | 2 | 0.702 | | | | | |
| Overall | 42 | 2.551 | 2.372 | 2.744 | 25.212 | 0.000 | | | | | | | | |

Toward the right of the screen the program displays information about between-study heterogeneity. As was true for the single-group of studies, these statistics are based on FE weights and are therefore displayed in the top section, but they apply to the RE analysis as well.

The omnibus test for heterogeneity within subgroups yields a Q-value of 89.067 with 39 *df* and p < 0.001. Therefore, there is evidence of dispersion in true effects within subgroups of studies.

This is are goodness-of-fit test. It asks if the grouping (drug type) explains all of the variance in true effect sizes, or if some true variance remains, even within subgroups. Here, there is evidence of true variance within subgroups.

Note that the tests of homogeneity are displayed in the fixed-effect section, even though we're using the random-effects model within subgroups. This is because these tests always are always based on using within-study (fixed-effect) weights. That is, we pose the null (that T^2 is zero) and then see is the variance is consistent with the null.

Click Next table to return to this screen.

| + Comprehensive meta ana | lysis - [Analy | /sis] |
|--------------------------|----------------|-------|
|--------------------------|----------------|-------|

| <u>F</u> ile <u>E</u> dit | F <u>o</u> rmat <u>V</u> i | ew Computational options | Analyses | Help | | | | | | | | | | | |
|---------------------------|--|--------------------------|------------|---------------------------|----------------|----------------|---------|------|-----------------------|--------|------------|------|---------------------|-----------------|--|
| + Data er | ← Data entry t7 Next table 🕀 High resolution plot 🔤 Select by + Effect measure: Risk ratio + 🗐 🛄 🛱 🏹 🗱 🗜 1 👔 🗘 | | | | | | | | | | | | | | |
| Model | Model Group by Study name | | | Statistics for each study | | | | | Risk ratio and 95% Cl | | | | Weight (Pooled tau) | | |
| | | | Risk ratio | Lower limit | Upper limit | Z-Value | p-Value | 0.01 | 0.1 | 0 1.00 | 1 | 0.00 | 100.00 | Relative weight | |
| | Cialis | Eardley, 2004 | 3.609 | 2.138 | 6.093 | 4.805 | 0.000 | - I. | I | | | 1 | 1 | 5.32 | |
| | Cialis | Guo, 2006 | 1.901 | 1.542 | 2.344 | 6.010 | 0.000 | | | | + | | | 12.94 | |
| | Cialis | McMahon, 2005 | 6.103 | 2.866 | 12.994 | 4.691 | 0.000 | | | | | + | | 3.02 | |
| | Cialis | Nagao, 2006 | 2.565 | 1.866 | 3.526 | 5.804 | 0.000 | | | | | | | 9.54 | |
| | Cialis | Rajifer, 2007 | 2.597 | 1.815 | 3.714 | 5.225 | 0.000 | | | | | | | 8.49 | |
| | Cialis | Saylan, 2006 | 1.936 | 1.266 | 2.961 | 3.049 | 0.002 | | | - | | | | 7.00 💻 | |
| | Cialis | Seftel, 2004 | 4.231 | 2.344 | 7.636 | 4.788 | 0.000 | | | | | | | 4.47 📕 | |
| | Cialis | Skoumal, 2004 | 2.628 | 1.987 | 3.475 | 6.775 | 0.000 | | | | | | | 10.67 | |
| | Cialis | Yip, 2006 | 2.861 | 2.049 | 3.993 | 6.176 | 0.000 | | | | | | | 9.12 | |
| Random | Cialis | | 2.499 | 2.163 | 2.887 | 12.443 | 0.000 | | | | + | | | | |
| | Levitra | Carson, 2004 | 4.096 | 2.913 | 5.760 | 8.108 | 0.000 | | | | | | | 8.81 | |
| | Levitra | Edwards, 2006 | 2.105 | 1.522 | 2.913 | 4.494 | 0.000 | | | | +- | | | 9.24 | |
| | Levitra | Hatzichristou, 2004 | 2.408 | 1.855 | 3.125 | 6.605 | 0.000 | | | | + | | | 11.11 | |
| | Levitra | Hellstrom, 2002 | 3.123 | 2.312 | 4.218 | 7.423 | 0.000 | | | | + | | | 9.91 | |
| | Levitra | Martin-Morales, 2007 | 2.321 | 1.682 | 3.203 | 5.126 | 0.000 | | | | | | | 9.31 | |
| | Levitra | Nagao, 2004 | 2.321 | 1.682 | 3.203 | 5.126 | 0.000 | | | | | | | 9.31 | |
| | Levitra | Porst, 2001 | 2.469 | 1.893 | 3.222 | 6.661 | 0.000 | | | | + | | | 10.95 | |
| | Levitra | Ralph, 2007 | 3.053 | 2.330 | 4.001 | 8.091 | 0.000 | | | | + | | | 10.81 | |
| | Levitra | Tan, 2008 | 3.369 | 2.219 | 5.115 | 5.702 | 0.000 | | | | | | | 7.05 | |
| Dandara | Levitra | Valiquette, 2005 | 2.502 | 2.074 | 3.020 | 9.567 | 0.000 | | | | + | | | 13.49 | |
| Handom | Levitra | Pasher 2002 | 2.630 | 2.330 | 3.104 | 13.030 | 0.000 | | | | + | | | 4.00 | |
| | Viagra Misera | Chon 2001 | 2.203 | 1.300 | 3.200 2.905 | 4.440 C C14 | 0.000 | | | | | | | 4.30 | |
| | Viagra | Chei, 2001 Chei, 2003 | 2.270 | 1.704 | 2.303 | 5.056 | 0.000 | | | | - | | | 4 95 | |
| | Viagra | Christiansen 2000 | 3 200 | 2 282 | 4 499 | 6 743 | 0.000 | | | | | | | 4.33 | |
| | Viagra | Dinsmore 1999 | 4 358 | 2 455 | 7 734 | 5.029 | 0.000 | | | | | | | 2 44 | |
| | Viagra | Glina 2001 | 2 269 | 1 759 | 2.928 | 6 299 | 0.000 | | | | | | | 5.98 | |
| | Viagra | Goldstein, 1998 | 2.874 | 2.238 | 3.691 | 8.270 | 0.000 | | | | | | | 6.06 | |
| | Viagra | Gomez, 2002 | 1.647 | 1.264 | 2.145 | 3.697 | 0.000 | | | - | + | | | 5.82 | |
| | Viagra | Heiman at al, 2007 | 2.746 | 1.877 | 4.018 | 5.205 | 0.000 | | | | — — | | | 4.16 | |
| | Viagra | Jones, 2008 | 2.083 | 1.570 | 2.763 | 5.088 | 0.000 | | | | + | | | 5.53 | |
| | Viagra | Kadioglu, 2008 | 2.079 | 1.711 | 2.527 | 7.357 | 0.000 | | | | + | | | 7.02 | |
| | Viagra | Kongkanand, 2003 | 2.326 | 1.632 | 3.315 | 4.670 | 0.000 | | | | — — | | | 4.48 | |
| | Viagra | Levinson, 2003 | 2.750 | 2.028 | 3.731 | 6.505 | 0.000 | | | | + | | | 5.18 📕 | |
| | Viagra | Meuleman, 2001 | 3.253 | 2.440 | 4.338 | 8.035 | 0.000 | | | | + | | | 5.45 | |
| | Viagra | Montorsi, 1999 | 3.260 | 2.373 | 4.478 | 7.296 | 0.000 | | | | - | | | 5.00 | |
| | Viagra | Olsson, 2000 | 2.020 | 1.548 | 2.637 | 5.178 | 0.000 | | | | + | | | 5.79 | |
| | Viagra | Padma-Nathan, 1998 | 3.810 | 2.606 | 5.570 | 6.903 | 0.000 | | | | - | | | 4.16 | |
| | Viagra | Tan, 2000 | 2.638 | 2.029 | 3.429 | 7.248 | 0.000 | | | | -+- | | | 5.86 | |
| | Viagra | Young, 2002 | 2.326 | 1.901 | 2.844 | 8.216 | 0.000 | | | | + | | | 6.91 | |
| Handom | Viagra | | 2.507 | 2.259 | 2.783 | 17.276 | 0.000 | | | | + | | | | |
| nandom | overall | | 2.551 | 2.372 | 2.744 | 25.212 | 0.000 | | | | - | | | | |
| Fixed Ra | indom Bo | th models | | | | | | | | | | | | | |
| Basic sta | s Calculat | ions | | | | | | | | | | | | | |

We can run the same analysis using regression

Click Computational options > Group by > No grouping to turn off the grouping



Click Analysis > Meta regression 2

| Ŧ | Compre | nensive meta analysis - [Ana | alysis] | | _ | | | | | 1 | | | | |
|----|------------------|---|----------------|----------------|----------------|----------------|----------------|---------------|------|---------------|--------|--------|------------------------|--|
| Ei | ile <u>E</u> dit | F <u>o</u> rmat <u>V</u> iew Computatio | onal options | Analyses | <u>H</u> elp | | | | | | | | | |
| + | Data ent | ry t ⁻ Next table | 井 High re | s 🛕 Public | ation bias | + E | ffect measur | e: Risk ratio | - | | II ≇ E | £ 🚺 🗘 | | |
| | Model | Study name | | Meta i | regression 2 | L.J. | | | Risk | ratio and 95% | CI | | Weight (Random) | |
| | | | Risk ratio | Lower limit | Upper limit | Z-Value | p-Value | 0.01 | 0.10 | 1.00 | 10.00 | 100.00 | Relative weight | |
| | | Jones, 2008 Kadioglu, 2008 | 2.083 2.079 | 1.570 1.711 | 2.763 2.527 | 5.088 7.357 | 0.000 0.000 | | | + + | | | 2.69 2 .69 3.43 | |
| | | Kongkanand, 2003 Levinson, 2003 | 2.326 2.750 | 1.632 2.028 | 3.315 3.731 | 4.670 6.505 | 0.000 0.000 | | | + | | | 2.18 | |
| | | Meuleman, 2001 Montorsi 1999 | 3.253 3.260 | 2.440 2.373 | 4.338 4.479 | 8.035 7 296 | 0.000 n nnn | | | | | | 2.65 | |

Define a model using Drug as the covariate

| T Comprehensive meta analysis - [Meta-regression] | | | | | | | | | | |
|---|---------------------------------------|---------------------------------|-------------------|----------------------------|------------------|--|--|--|--|--|
| <u>F</u> ile Cova | riates Models Computational options D | ecimals Analyses <u>H</u> elp 😲 | | Return to basic analysis 🔶 | → Run regression | | | | | |
| Models: \Box Clear models $ \uparrow $ Insert model $ \uparrow $ Delete model ${\capuellerightarrow}_{B}$ Rename model ${\capuellerightarrow}_{B}$ Generate sequence \bullet \leftarrow \rightarrow | | | | | | | | | | |
| Covariates: | E Show covariates 🧲 Remove covariates | ↑ Move up 👃 Move down | C Link covariates | \checkmark | | | | | | |
| | | | | | | | | | | |
| Set | Covariates | Model 1 | | | | | | | | |
| | | | | | | | | | | |
| | Intercept | | | | | | | | | |
| | Drug: Cialis | \checkmark | | | | | | | | |
| Drug | Drug: Levitra | \checkmark | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

The model yields a Q-value of 0.7077 with 2 df and p = 0.7020, which are the same numbers we saw for the subgroups analysis.

The R^2 analog is 0%, which tells us that the drug type explained none of the variance in effect sizes.

| ile Computa | ational options Decimals Analy | ses <u>H</u> elp 😲 | | | | | ← Modify models | Main results | III Scatterplot |
|---|--|---|--|----------------------------------|--------------|---------|--------------------|--------------------|------------------------|
| Main results for Model 1, Random effects (MM), Z-Distribution, Log risk ratio | | | | | | | | | |
| Set | Covariate | Coefficient | Standard Error | 95% Lower | 95% Upper | Z-value | 2-sided P-value | | |
| | Intercept | 0.9191723 | 0.0532052 | 0.8148921 | 1.0234525 | 17.2760 | 0.0000 | | |
| | Drug: Cialis | -0.0032813 | 0.0908218 | -0.1812887 | 0.1747262 | -0.0361 | 0.9712 | 77 16 0 0 7000 | |
| Drug | Drug: Levitra | 0.0702254 | 0.0904338 | -0.1070216 | 0.2474724 | 0.7765 | 0.4374 Q=0.70 | //, at=2, p=0.7020 | |
| | Test of the model: Sin Q = 0.7077, df = 2, p = 0 Goodness of fit: Test Tau ² = 0.030434825, Ta | nultaneous test that al 0.7020 that unexplained varia u = 0.174455796, I ² = 56 | l coefficient ance is zero 5.21%, Q = 89 | s (excluding i .0670, df = 39 | intercept) a | re zero | | | |
| | Comparison of Model | 1 with the null model | | | | | | | |
| | Total between-study | variance (intercept on | ly) | | | | | | |
| | Tau ² = 0.030037952, Ta | u = 0.173314604, l ² = 56 | 5.26%, Q = 93 | .7355, df = 41 | , p = 0.0000 | | | | |
| | Proportion of total be | tween-study variance | explained b | y Model 1 | | | | | |
| | R* analog = 0.00 (comp | outed value is -0.01) | | | | | | | |
| | Number of studies in | the analysis 12 | | | | | | | |

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Summary

The analysis includes 42 studies. All studies used the same paradigm, where patients suffering from erectile dysfunction were randomly assigned to either drug or placebo. Outcome was self-reports of improved function. The effect size was the risk ratio.

The active drug in some studies was Viagra, in some studies was Levitra, and in some studies was Cialis. We used subgroup analysis to see if the effect size varied by drug.

Does drug improve sexual function?

The mean risk ratio is 2.550, which means that the drug increased the chance of success by a factor of around 2.5.

These studies were sampled from a universe of possible studies defined by certain inclusion/exclusion rules as outlined in the full paper. The confidence interval for the risk ratio is 2.372 to 2.742, which tell us that the <u>mean</u> risk ratio in the universe of studies could fall anywhere in this range. This range does not include a risk ratio of 1.0, which tells us that the mean risk ratio is probably not 1.0.

Similarly, the Z-value for testing the null hypothesis (that the mean risk ratio is 1.0) is 25.299, with a corresponding p-value is < 0.001. We can reject the null that the drug has no impact on response rate, and conclude that it does lead to a higher likelihood of improved function.

Does the effect size vary across studies?

The *observed* effect size varies somewhat from study to study, but a certain amount of variation is expected due to sampling error. We need to determine if the observed variation falls within the range that can be attributed to sampling error (in which case there is no evidence of variation in true effects), or if it exceeds that range.

The *Q*-statistic provides a test of the null hypothesis that all studies in the analysis share a common effect size. If all studies shared the same effect size, the expected value of *Q* would be equal to the degrees of freedom (the number of studies minus 1).

The *Q*-value is 93.736 with 41 degrees of freedom and p < 0.001. Thus, we can reject the null that the true effect size is the same in all studies. Rather, the true effect size varies from study to study.

The l^2 statistic tells us what proportion of the observed variance reflects differences in true effect sizes rather than sampling error. l^2 is 56.26, which tells us that about 56% of the variance in observed effects reflects variance in true effects. If we could somehow plot the true effects rather than the observed effects, the variance in the new plot would be about 56% as large as the variance in the current plot.

 T^2 is the variance of true effect sizes (in log units). Here, T^2 is 0.030. *T* is the standard deviation of true effects (in log units). Here, *T* is 0.173.

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Does the effect size vary by Drug?

We ran the analysis by subgroup, where studies were grouped based on the kind of drug used. The mean effect was approximately the same for Cialis, Levitra, and Viagra (risk ratios of 2.499, 2.690, and 2.507). The test to compare the three yields a Q-value of 0.708 with 1 df and p = 0.702. Thus, there was no evidence that any one of the drugs was more effective than the others.