Testiranje hipoteza o učestalostima

Nedelja 7 - Vežbe

Dr Nikola N. Grubor

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Treatment of Hypertension in Patients 80 Years of Age or Older

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ABSTRACT

METHODS

We randomly assigned 3845 patients from Europe, China, Australasia, and Tunisia who were 80 years of age or older and had a sustained systolic blood pressure of 160 mm Hg or more to receive either the diuretic indapamide (sustained release, 1.5 mg) or matching placebo. The angiotensin-converting–enzyme inhibitor perindopril (2 or 4 mg), or matching placebo, was added if necessary to achieve the target blood pressure of 150/80 mm Hg. The primary end point was fatal or nonfatal stroke.

RESULTS

The active-treatment group (1933 patients) and the placebo group (1912 patients) were well matched (mean age, 83.6 years; mean blood pressure while sitting, 173.0/90.8 mm Hg); 11.8% had a history of cardiovascular disease. Median follow-up was 1.8 years. At 2 years, the mean blood pressure while sitting was 15.0/6.1 mm Hg lower in the active-treatment group than in the placebo group. In an intention-to-treat analysis, active treatment was associated with a 30% reduction in the rate of fatal or nonfatal stroke (95% confidence interval [CI], –1 to 51; P=0.06), a 39% reduction in the rate of death from stroke (95% CI, 1 to 62; P=0.05), a 21% reduction in the rate of death from any cause (95% CI, 4 to 35; P=0.02), a 23% reduction in the rate of death from cardiovascular causes (95% CI, –1 to 40; P=0.06), and a 64% reduction in the rate of heart failure (95% CI, 42 to 78; P<0.001). Fewer serious adverse events were reported in the active-treatment group (358, vs. 448 in the placebo group; P=0.001).

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*The committee members and investigators for the Hypertension in the Very Elderly Trial (HYVET) are listed in the Appendix.

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Šta je nulta hipoteza?

RESULTS

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Da li su uzorci nezavisni?

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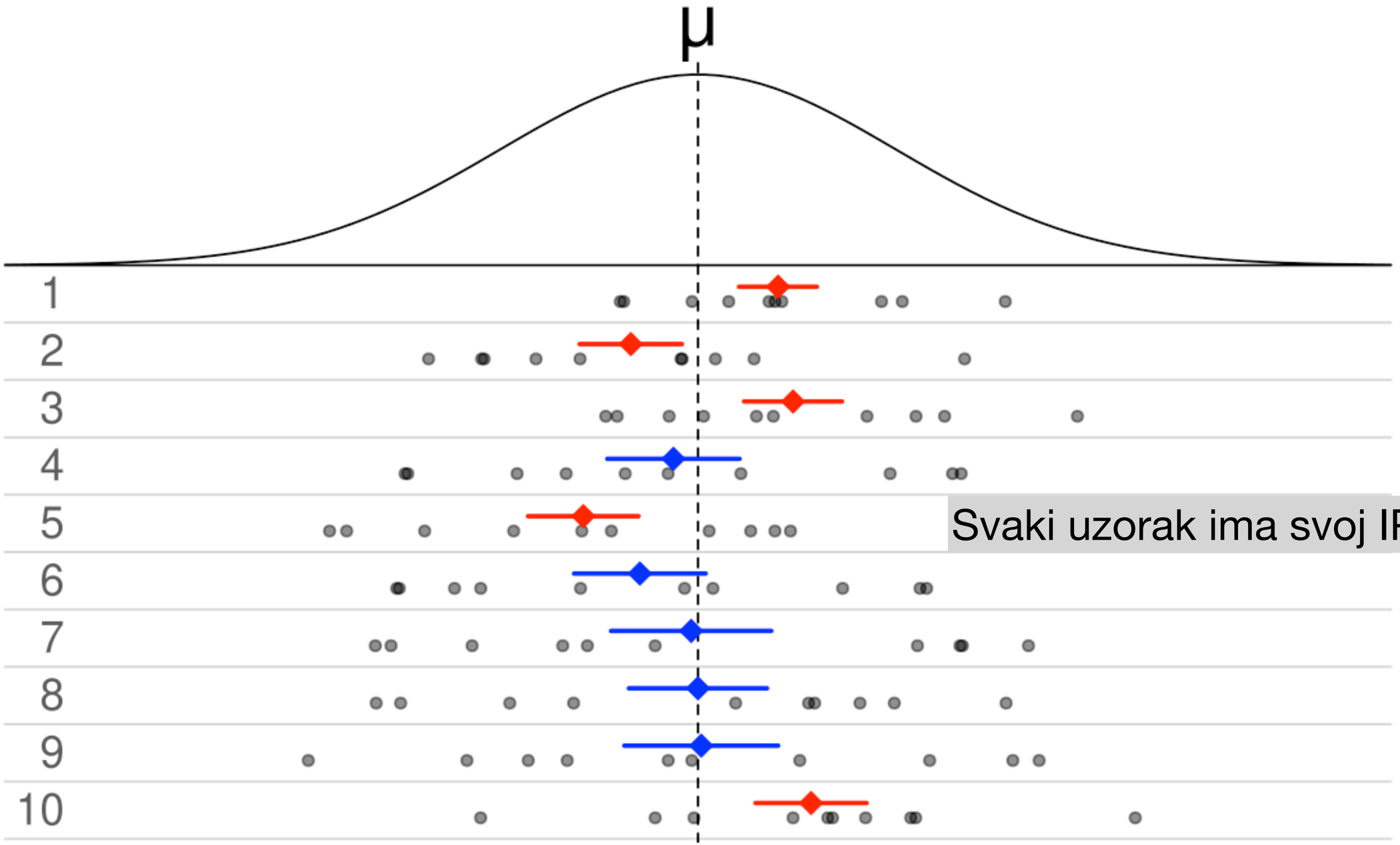
Šta mi govori interval poverenja od 95%?



Svaki uzorak ima svoj IP.

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A p-vrednost?

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We randomly assigned 3845 patients from Europe, China, Australasia, and Tunisia who were 80 years of age or older and had a sustained systolic blood pressure of 160 mm Hg or more to receive either the diuretic indapamide (sustained release, 1.5 mg) or matching placebo. The angiotensin-converting–enzyme inhibitor perindopril (2 or 4 mg), or matching placebo, was added if necessary to achieve the target blood pressure of 150/80 mm Hg. The primary end point was fatal or nonfatal stroke.

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Šta ako je 95% CI [-1, 2]; p = 0.06?

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Šta ako je p-vrednost 0.05 umesto 0.06?

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Šta ako je p-vrednost < 0.001 umesto 0.06?

Greške u Zaključivanju

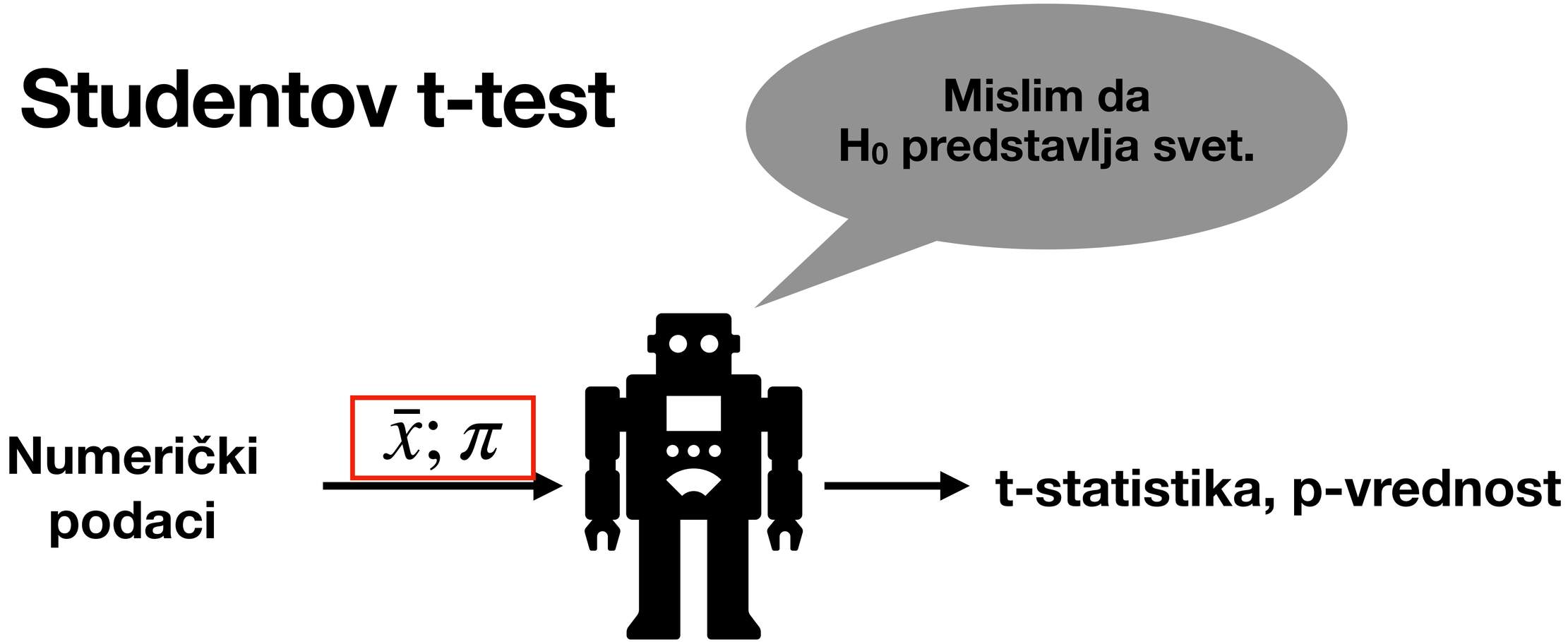
Tabela 1. Ishodi odlučivanja u testiranju hipoteza

Odluka istraživača na osnovu analize uzoračkih podataka	Istina (populacija)	
	H_0 istinita	H_0 neistinita
Odbacivanje H_0	Greška prvog tipa (α)	Ispravan zaključak ($1-\beta$ = snaga testa)
Prihvatanje H_0	Ispravan zaključak ($1-\alpha$ = nivo poverenja)	Greška drugog tipa (β)

Koraci u statističkom zaključivanju

1. Hipoteza
2. Izbor značajnosti (0.05, 0.01)
3. Izbor test statistike (t-statistika, χ^2-statistika, itd.)
4. Izračunavanje statistike testa
5. Zaključak (p-vrednost)

Studentov t-test



1. **Slučajno biran uzorak**
2. **Numerički podaci**
3. **Normalna raspodela u populaciji**

Tabela kontigencije očekivanih vrednosti.

	Bronhitis	Bez bronhitisa	Ukupno
Kašalj			70
Bez kašlja			1249
Ukupno	273	1046	1319

5.3%

94.7%

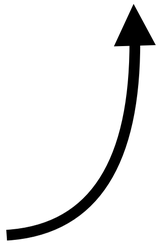


Tabela kontigencije očekivanih vrednosti.

	Bronhitis	Bez bronhitisa	Ukupno
Kašalj	14.5	55.5	70
Bez kašlja	258.5	990.5	1249
Ukupno	**273**	**1046**	**1319**

Očekivane učestalosti

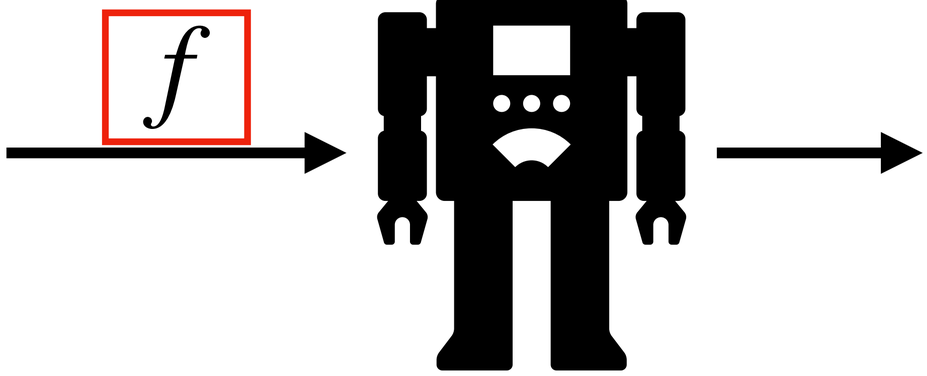
Opservirane učestalosti

	Bronhitis	Bez bronhitisa	Ukupno
Kašalj	26 (14.5)	44 (55.5)	70
Bez kašlja	247 (258.5)	1002 (990.5)	1249
Ukupno	**273**	**1046**	**1319**

Hi-kvadrat test

Mislim da očekivane učestalosti predstavljaju svet.

Kategorijalni podaci



hi²-statistika, p-vrednost

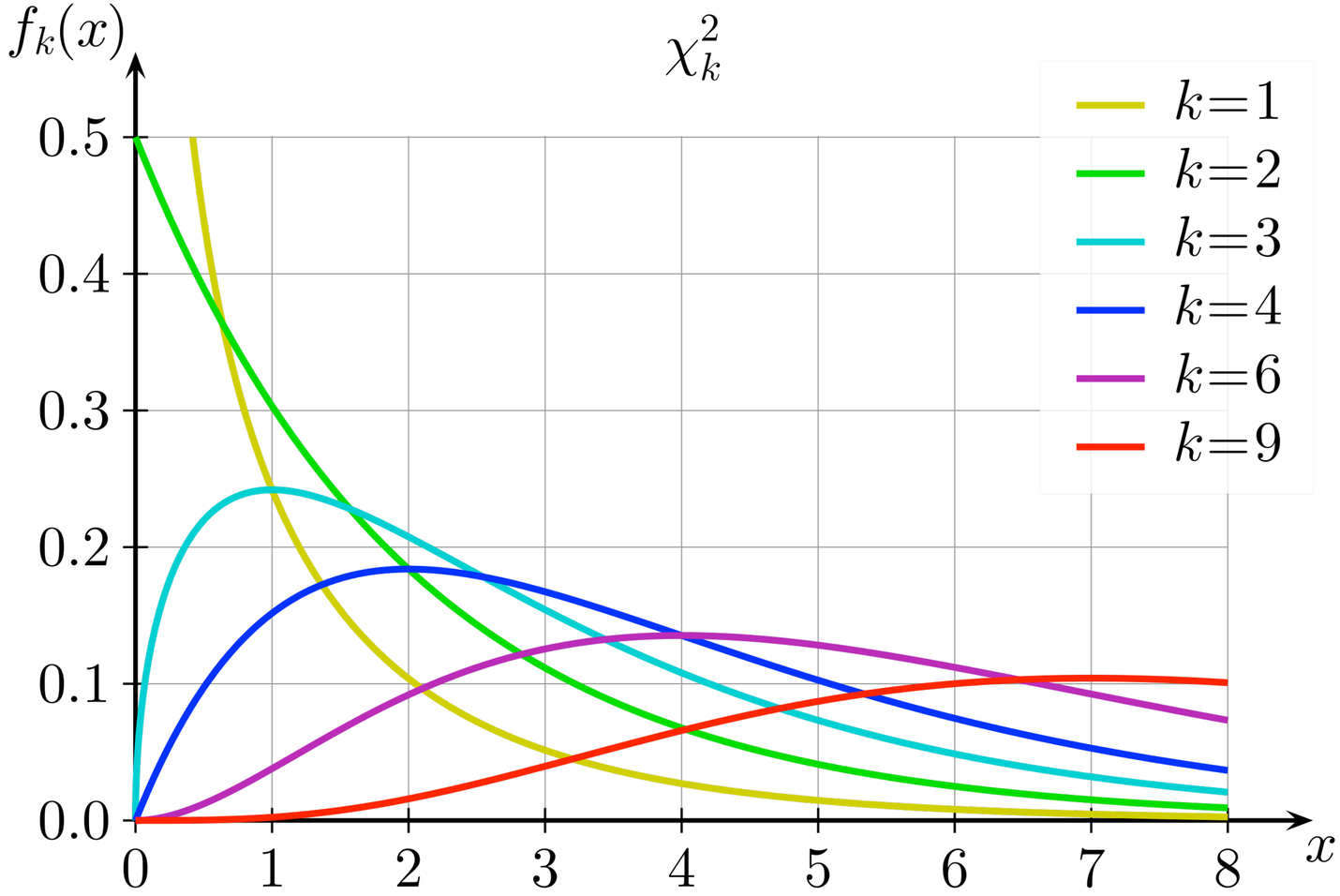
1. Apsolutne učestalosti (ne procenti, proporcije, merenja)
2. Uzorak čine nezavisne jedinice
3. 2 kategorije, nijedna očekivana f-ja ne sme < 5
4. 3+ kategorije, ne sme biti više od 20% očekivanih f-ja < 5
5. N > 20

Hi-kvadrat test

Tipovi

- Test slaganja (goodness-of-fit)
- Test za r x k (2x2) tabele

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$



Hi-kvadrat test

Test slaganja (goodness-of-fit)

	A	B	AB	O
Učestalost	59	19	7	55

Hi-kvadrat test

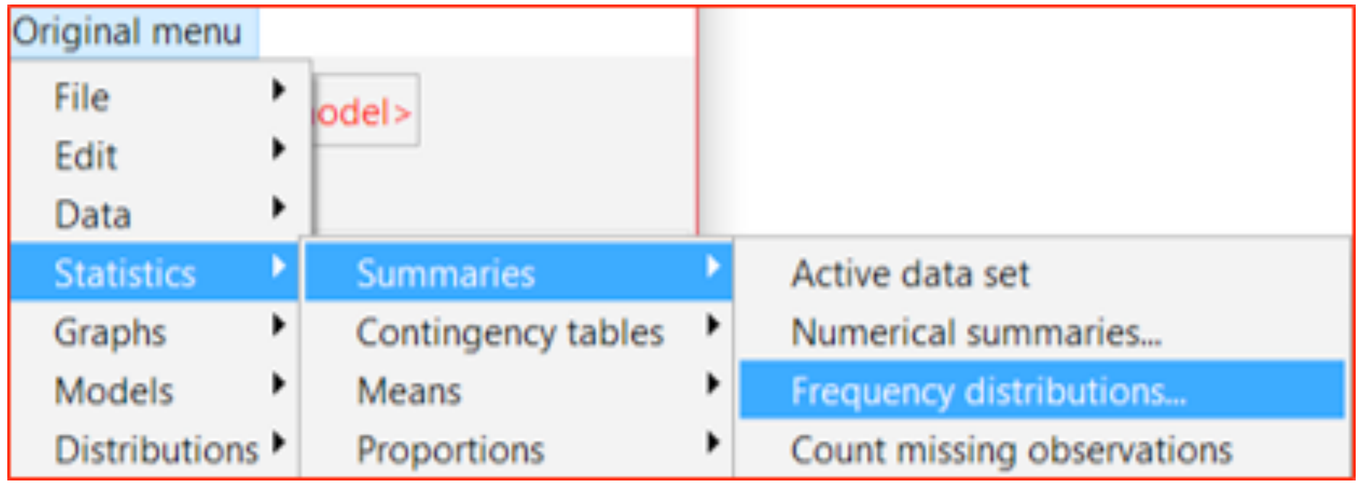
Test slaganja (goodness-of-fit)

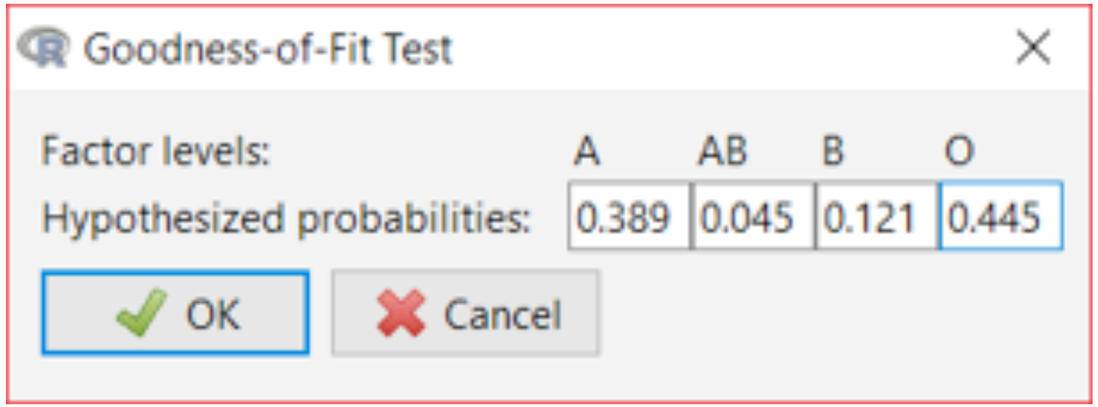
	A	B	AB	O
Učestalost	59	19	7	55

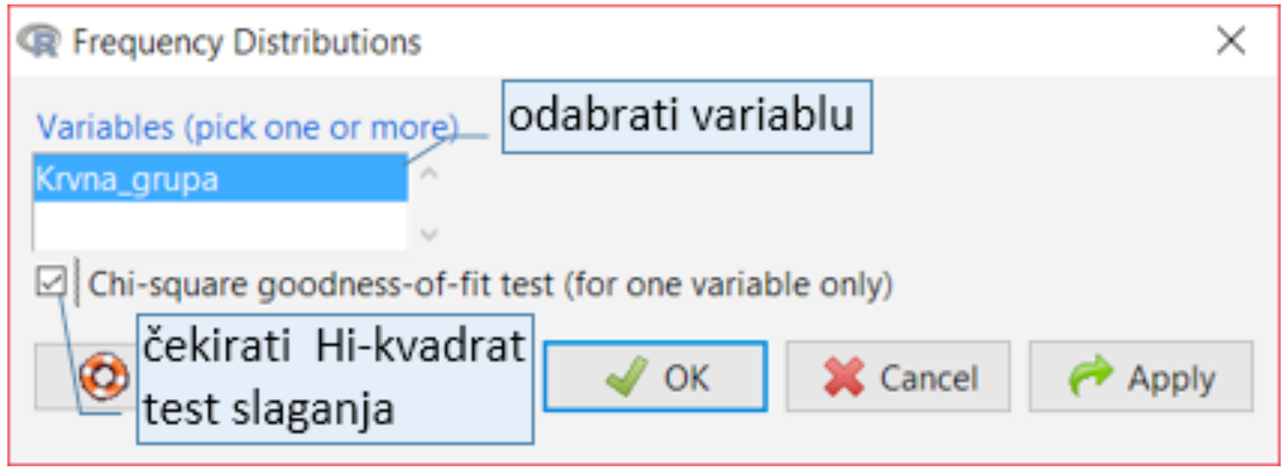
O – 44.5%
A – 38.9%
B – 12.1%
AB – 4.5%

Hi-kvadrat test

Test slaganja (goodness-of-fit)



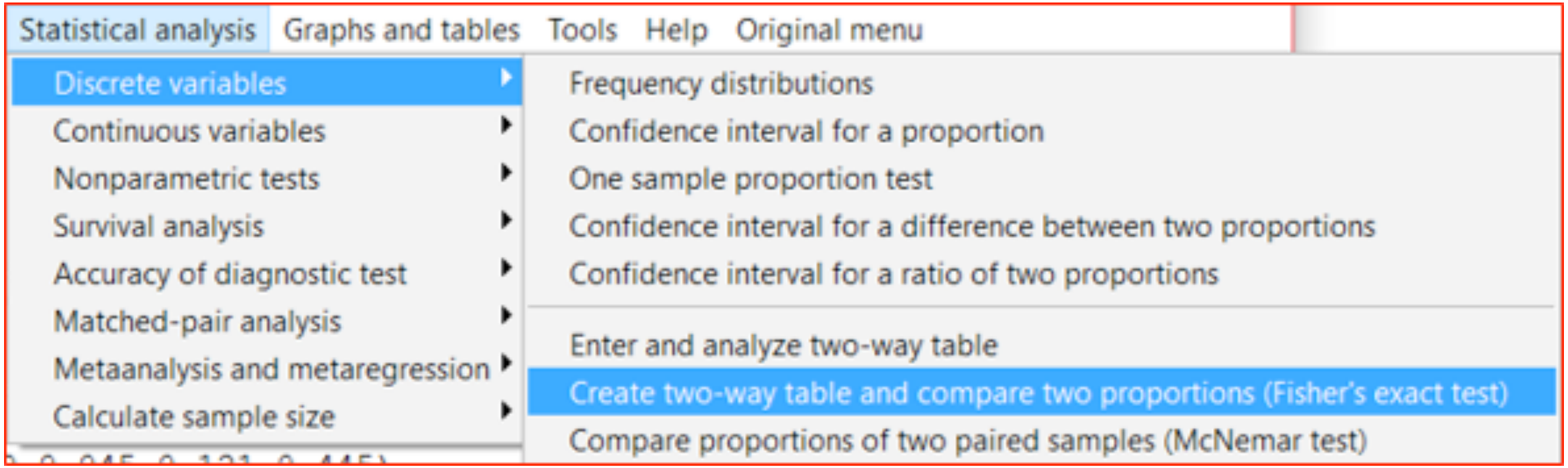




Hi-kvadrat test

Test za 2x2 tabele

Preuzeti i analizirati bazu podataka Osteoporoza.xlsx



Hi-kvadrat test

Test za formirane 2x2 tabele

		Patološki nalaz na jetri		
		+	–	Ukupno
Konzumiranje	+	10	16	26
alkohola	–	13	79	92
Ukupno		23	95	118

Šta je nulta hipoteza?

Hi-kvadrat test

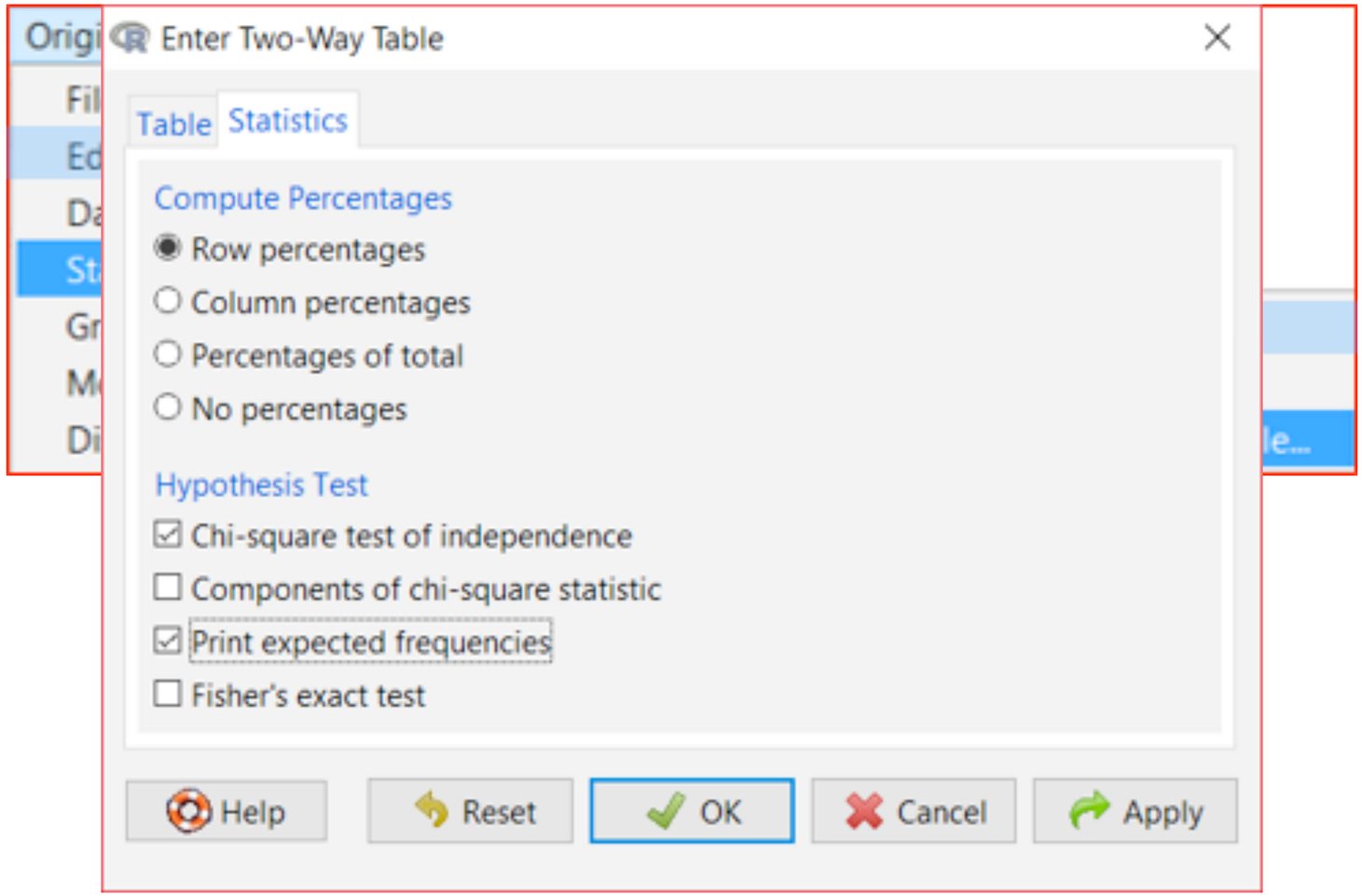
Test za formirane 2x2 tabele

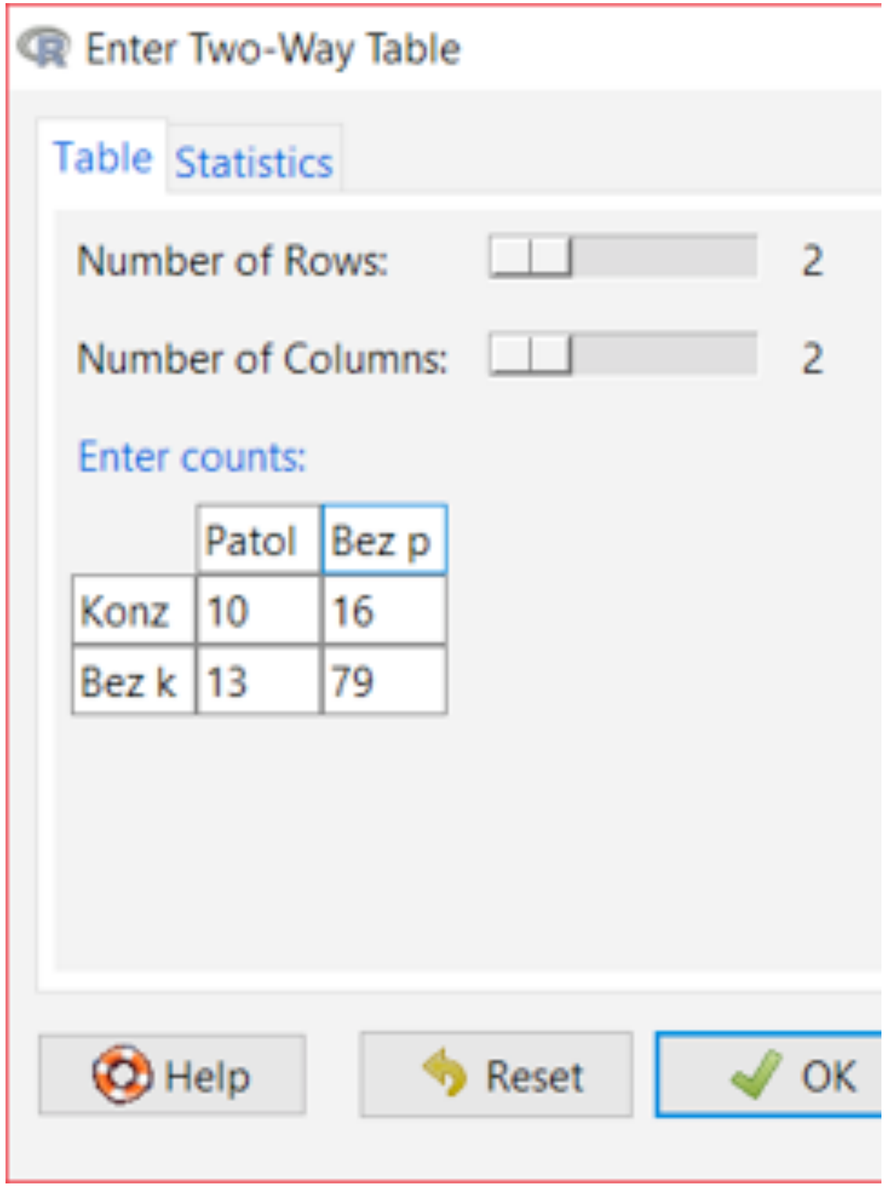
		Patološki nalaz na jetri		
		+	–	Ukupno
Konzumiranje	+	10	16	26
alkohola	–	13	79	92
Ukupno		23	95	118

Ne postoji razlika učestalosti patološkog nalaza na jetri u odnosu na konzumiranje alkohola.

Hi-kvadrat test

Test za formirane 2x2 tabele





McNemarov test

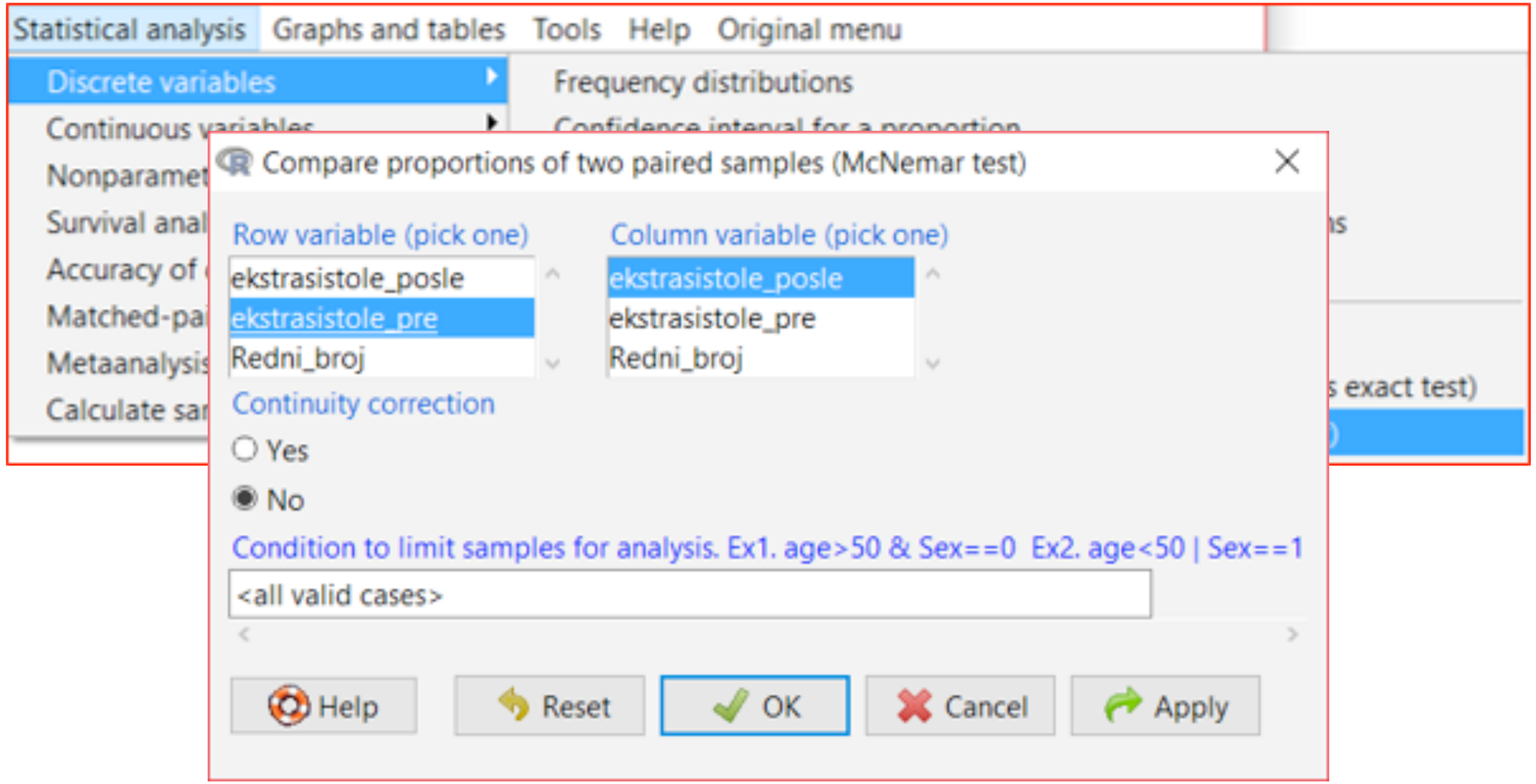
Test za vezane kategorije

- McNemarov test je neparametarski metod za testiranje dva vezana (zavisna) uzoraka.
- Iste jedinice opservirane više puta
- Mečovane jedinice dva uzorka

		Drugi uzorak (ili druga opservacija)		
		+	–	
Prvi uzorak (ili prva opservacija)	+	a	b	a+b
	–	c	d	c+d
		a+c	b+d	N

McNemarov test

Preuzeti i analizirati bazu podataka Aritmije.xlsx



Fisherov test tačne verovatnoće

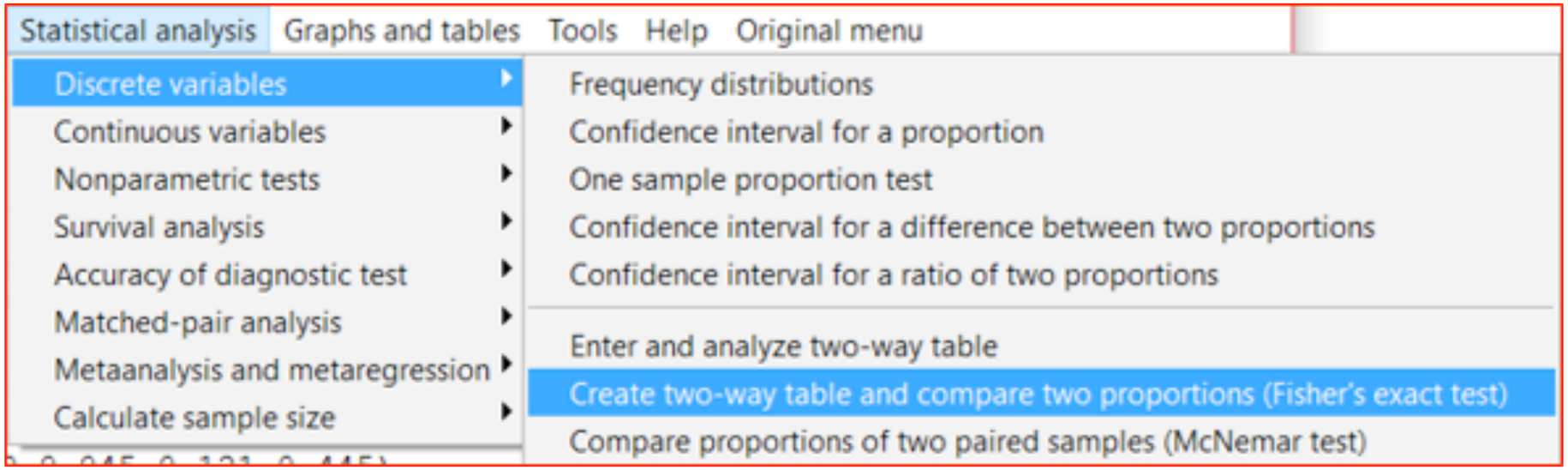
Fisher’s exact test

	Mleko prvo	Čaj prvo	Ukupno
Pogodak	4	4	8
Promašaj	0	0	0
Ukupno	4	4	8

Fisherov test tačne verovatnoće

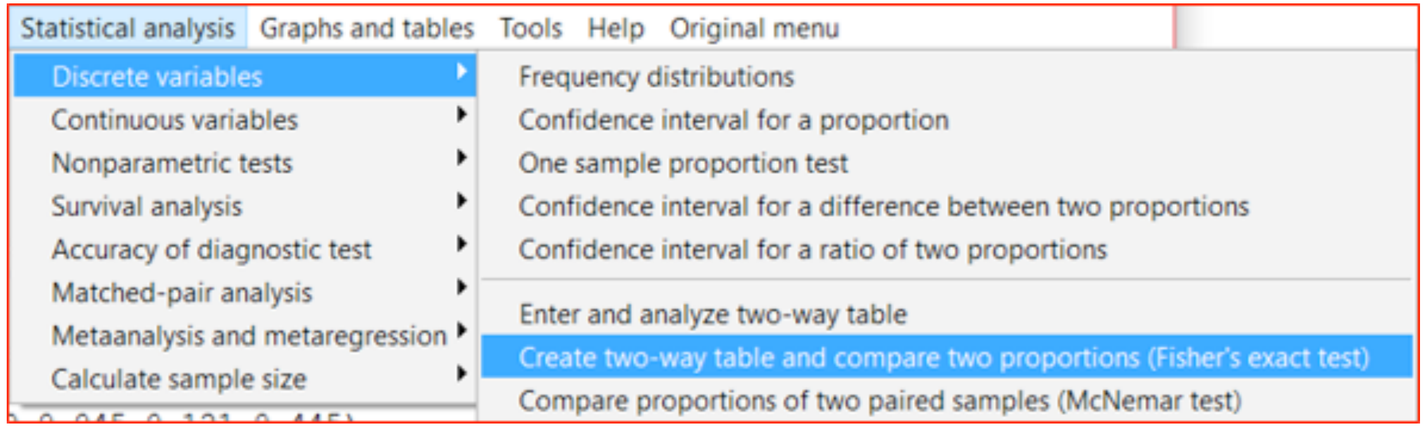
Fisher's exact test

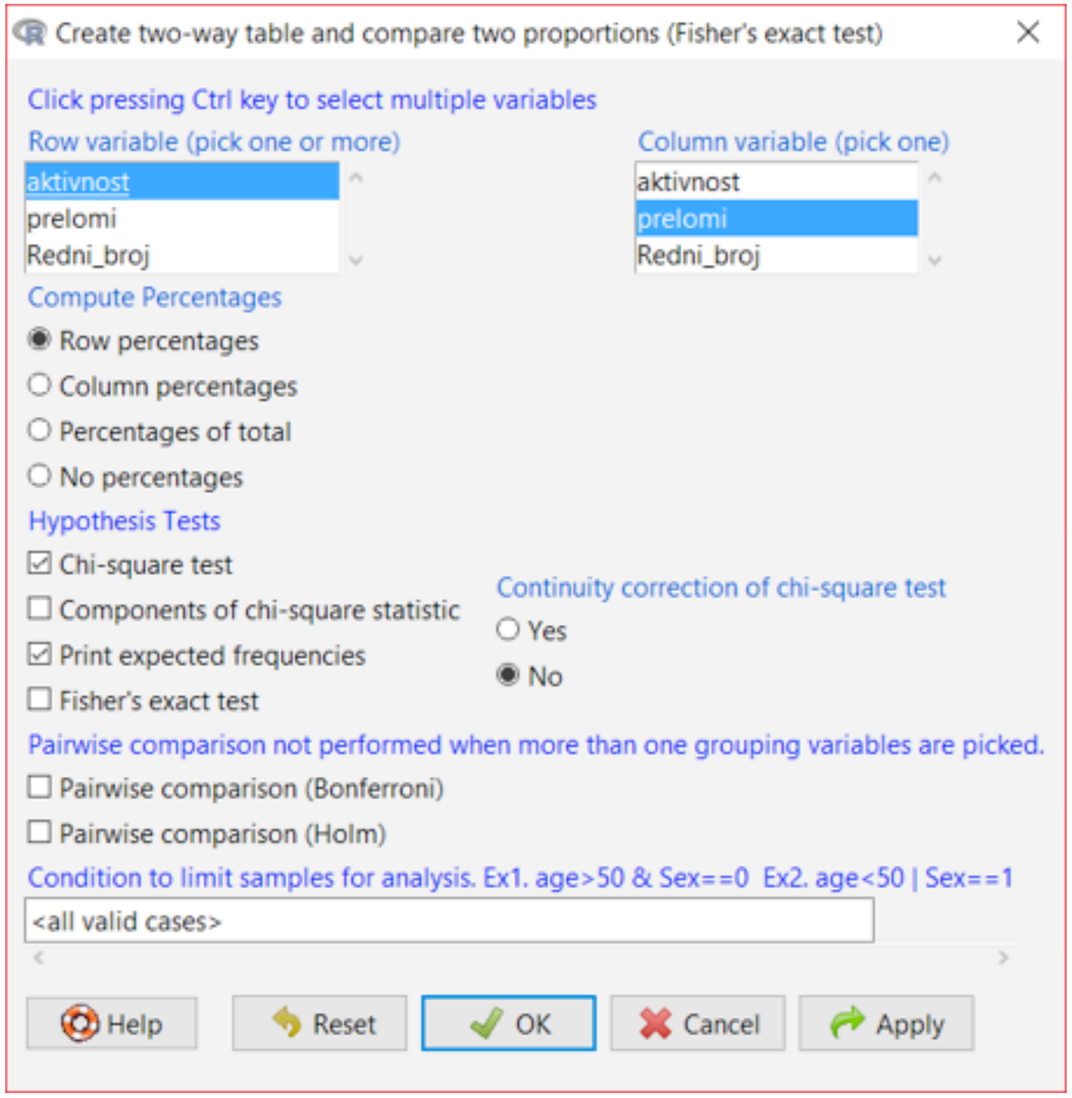
Preuzeti i analizirati bazu podataka Alkohol i hipertenzija.xlsx



Fisherov test tačne verovatnoće

Fisher's exact test



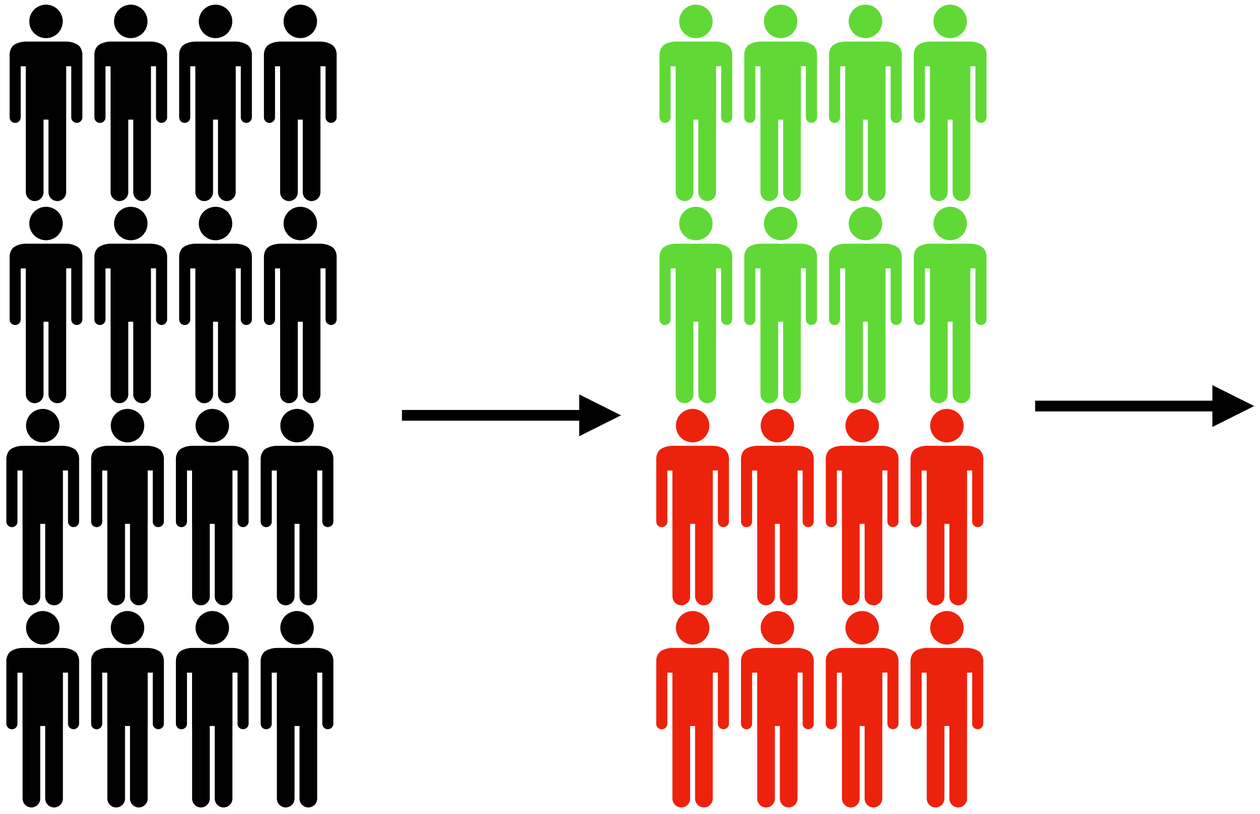


Numerički ili kategorijalni podaci?

Tip testa	Parametarski	Neparametarski
Jedan uzorak	t-test za jedan uzorak	Hi-kvadrat test slaganja
Dva nezavisna	t-test	Hi-kvadrat / Fisherov test tačne verovatnoće
Dva zavisna	t-test za zavisne uzorke	McNemarov test

Relation between insufficient response to antihypertensive treatment and poor compliance with treatment: a prospective case-control study

Reto Nuesch, Kerstin Schroeder, Thomas Dieterle, Benedict Martina, Edouard Battegay



Status	Method of BP measurement	
	Clinic	Ambulatory
Responder	43	55
Non-responder	62	50
Total	105	105

Fisherov test tačne verovatnoće

p = 0.127

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Fisherov test tačne verovatnoće

p = 0.127

Zašto ovaj test nije dobro upotrebljen?

Kako to utiče na p-vrednost?

Šta su trebali da urade?