

# Analisa Parametrik dengan SPSS

# Rancangan Penelitian Farmasi

- Rancangan penelitian : rencana atau struktur dan strategi penelitian yang disusun sedemikian rupa agar dapat memperoleh jawaban mengenai permasalahan penelitian.
- Kriteria :
  - Relevansi data
  - Objektivitas
  - Validitas
  - Reliabilitas
  - Teknis pelaksanaan yg efektif dan efisien

- Rancangan penelitian yang adekuat hendaklah dapat menguji kebenaran hipotesis dan sedapat mungkin mengendalikan atau mengontrol varians.
- Langkah-langkah mengontrol varians :
  - Memaksimalkan varians penelitian
  - Meniadakan/mengontrol variable ekstra (missal tikus dg umur, galur, dan jenis kelamin yg homogen pada kelompok percobaan)
  - Meminimalkan *error of varians*

# Jenis rancangan penelitian :

## 1. Eksperimental

- Perencanaan eksperimentasi sedemikian sehingga diperoleh informasi yg relevan dg permasalahan yg diteliti dan memungkinkan analisis yg objektif untuk memperoleh kesimpulan yang valid.
- Contoh : Uji aktivitas antiinflamasi ekstrak etanol daun matoa

## 2. Non eksperimental

- Penelitian yang observasinya dilakukan thd sejumlah variable subjek penelitian menurut keadaan apa adanya, tanpa ada intervensi peneliti.
- Jenis : deskriptif, survey, korelasional, kausal komparatif

# Metoda Statistika Farmasi

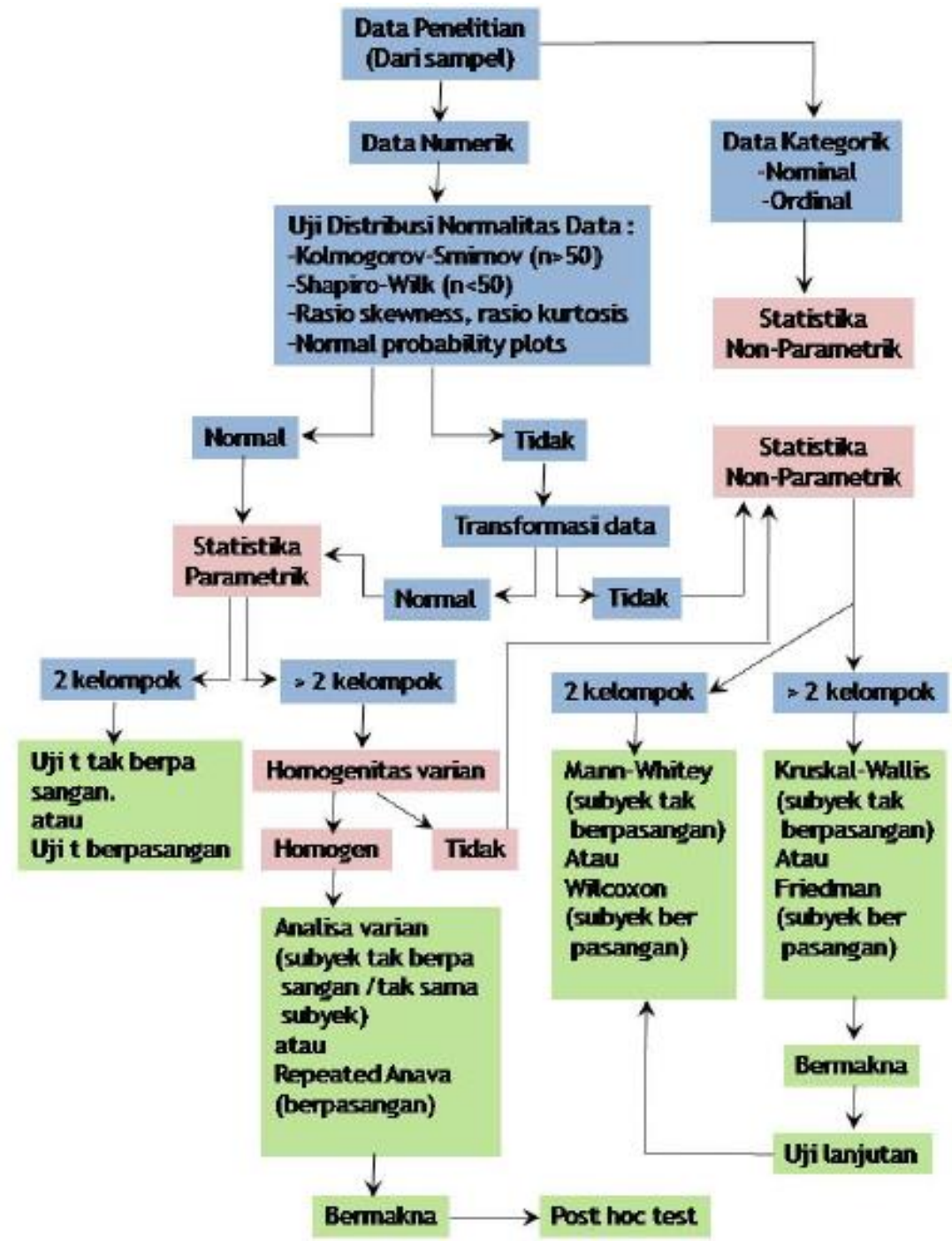
## 1. Statistika Parametrik

- Metode uji statistika yg menetapkan adanya syarat-syarat (asumsi) tertentu berkaitan dg variable random atau populasi
- Berhubungan dg pengambilan keputusan atas suatu permasalahan tertentu, yg membahas parameter-parameter populasi, misalnya rata-rata, proporsi
- Ciri : menggunakan data interval atau rasio, distribusi data atau populasi adalah normal atau mendekati normal

## 2. Statistika Non Parametrik

- Tidak menetapkan syarat yg berkaitan dg variable random atau populasi
- Mengakomodasi data yg tidak terdistribusi normal
- Perhitungan dilakukan **bukan** thd nilai data yg sesungguhnya, namun pada **peringkat data** dalam populasi
- Hasil interpretasi semu, krn data dibuat peringkat utk kemudian dianalisis
- Pengambilan keputusan atas permasalahan tdk membahas parameter-parameter populasi
- Ciri : jenis data nominal atau ordinal, distribusi data tdk diketahui atau apabila data interval/rasio datanya tdk terdistribusi normal

# Algoritma penggunaan metode statistika pada kebanyakan data-data penelitian farmasi



# Statistika Parametrik

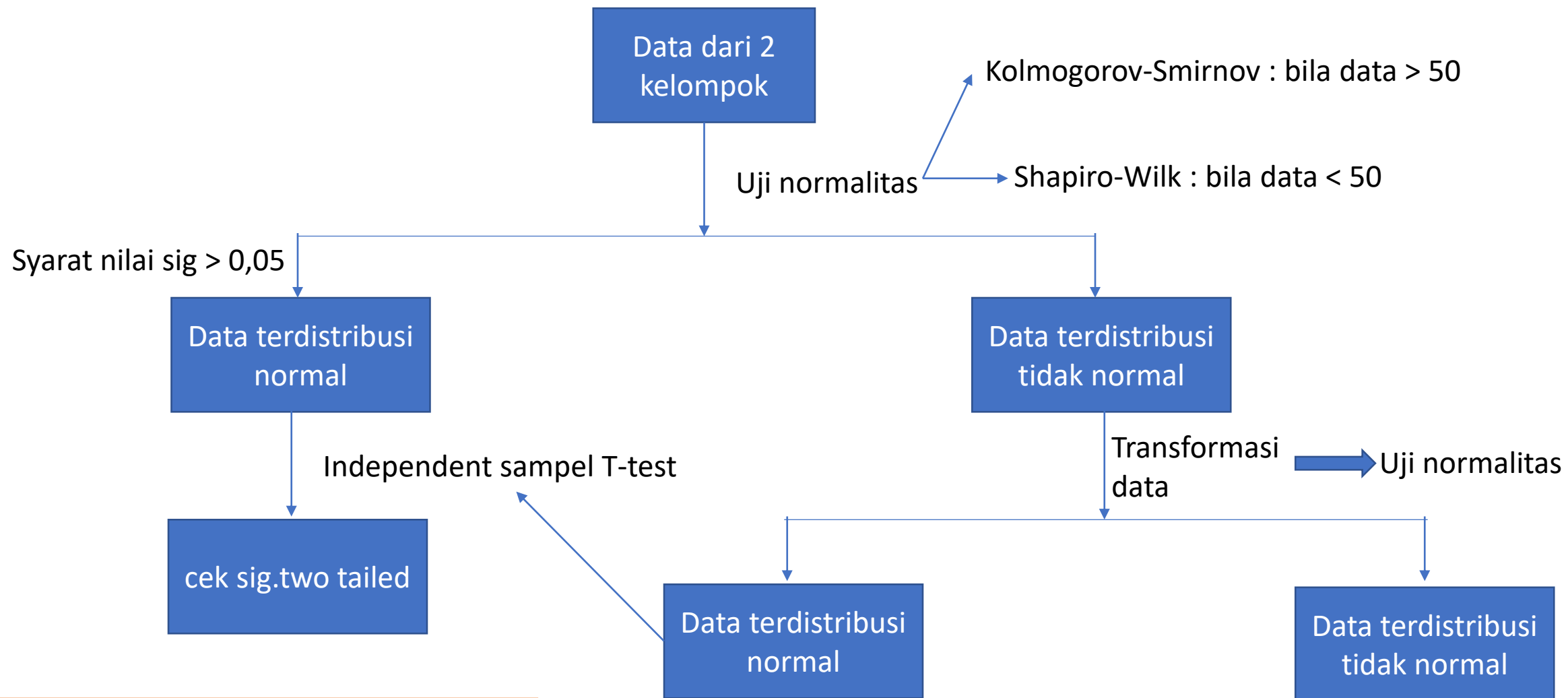
1. Uji T tdk berpasangan (*unpaired T-test*)
2. Uji T berpasangan (*paired T-test*)
3. *One sample T-test*
4. Analisa varian (*Analysis of variance*)/ANOVA
5. *Repeated ANOVA*

# 1. *Unpaired T-test/Independent sample T-test*

- Digunakan utk pengujian perbedaan rata-rata dari 2 sampel yg tdk berpasangan
- Subjek uji dari kedua kelompok atau sample tsb berbeda, dua sampel tsb berasal dari populasi yg berbeda
- Asumsi uji T tdk berpasangan : populasi-populasi yg diuji terdistribusi normal
- Varian dari populasi-populasi tsb boleh **sama** dan boleh **berbeda**



Perlakuan	%Daya Analgetik	%Daya antiinflamasi
1	68.80	30.45
1	70.54	34.32
1	65.32	32.67
1	68.54	35.89
1	64.57	33.40
1	69.89	34.38
1	64.54	32.65
1	65.34	35.87
1	68.92	34.45
1	67.64	33.87
2	40.76	78.35
2	35.45	76.98
2	38.38	79.56
2	37.29	78.98
2	39.48	75.34
2	38.64	80.97
2	41.87	79.54
2	35.64	76.65
2	34.98	77.87
2	38.23	75.98



Perumusan Hipotesis :

Ho : kedua populasi identic

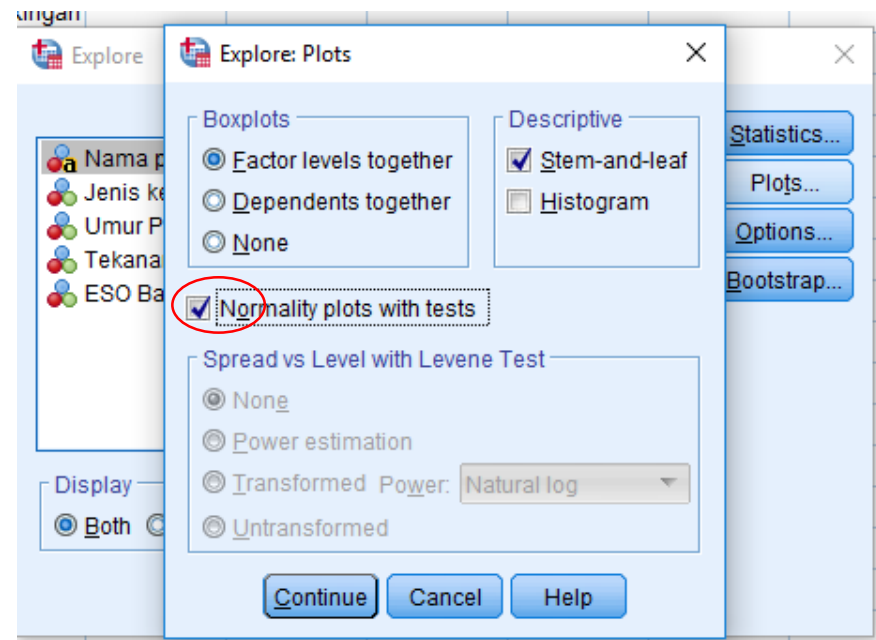
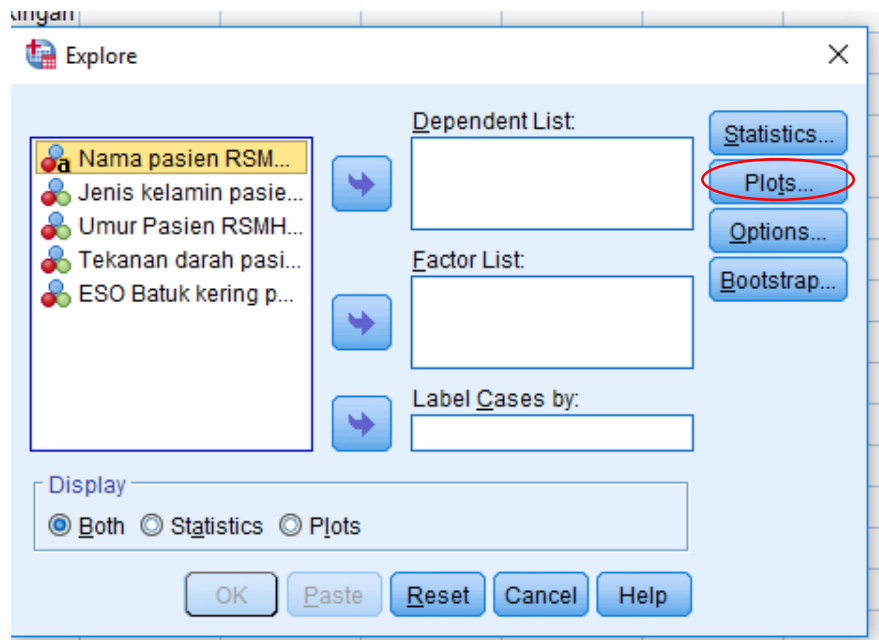
H1 : kedua populasi tidak identic

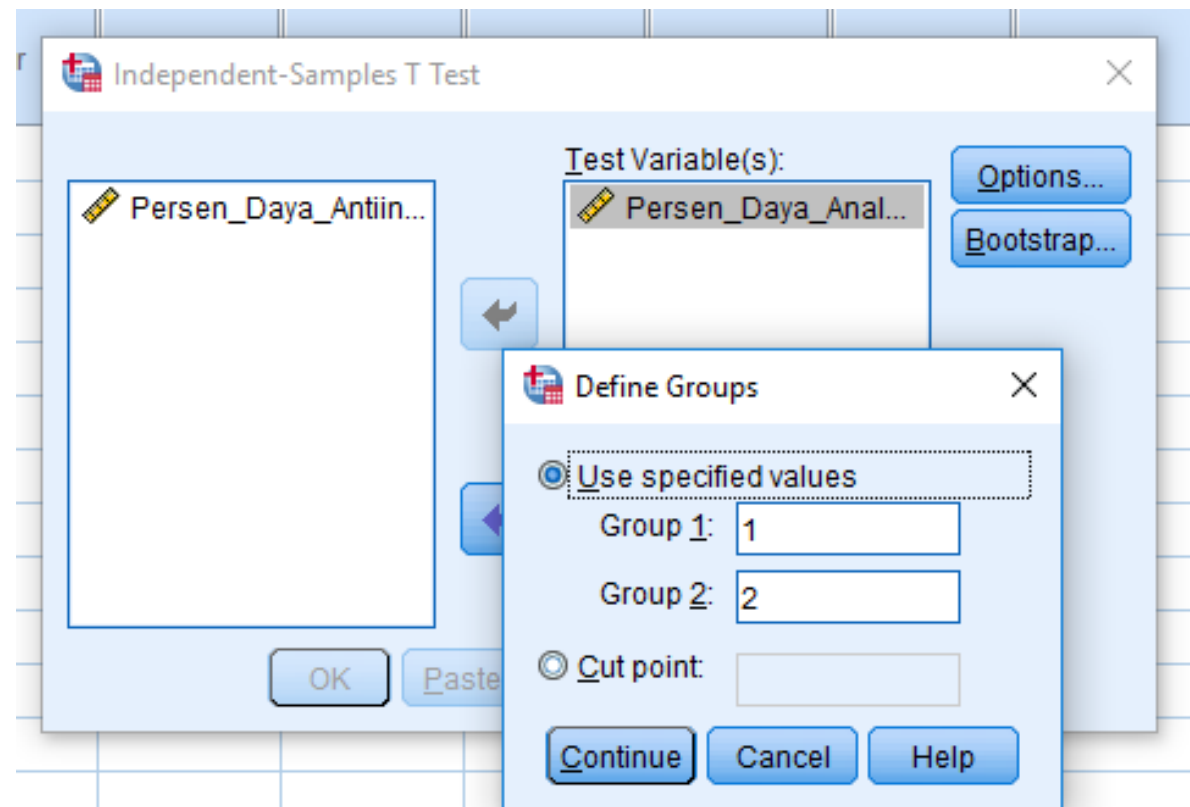
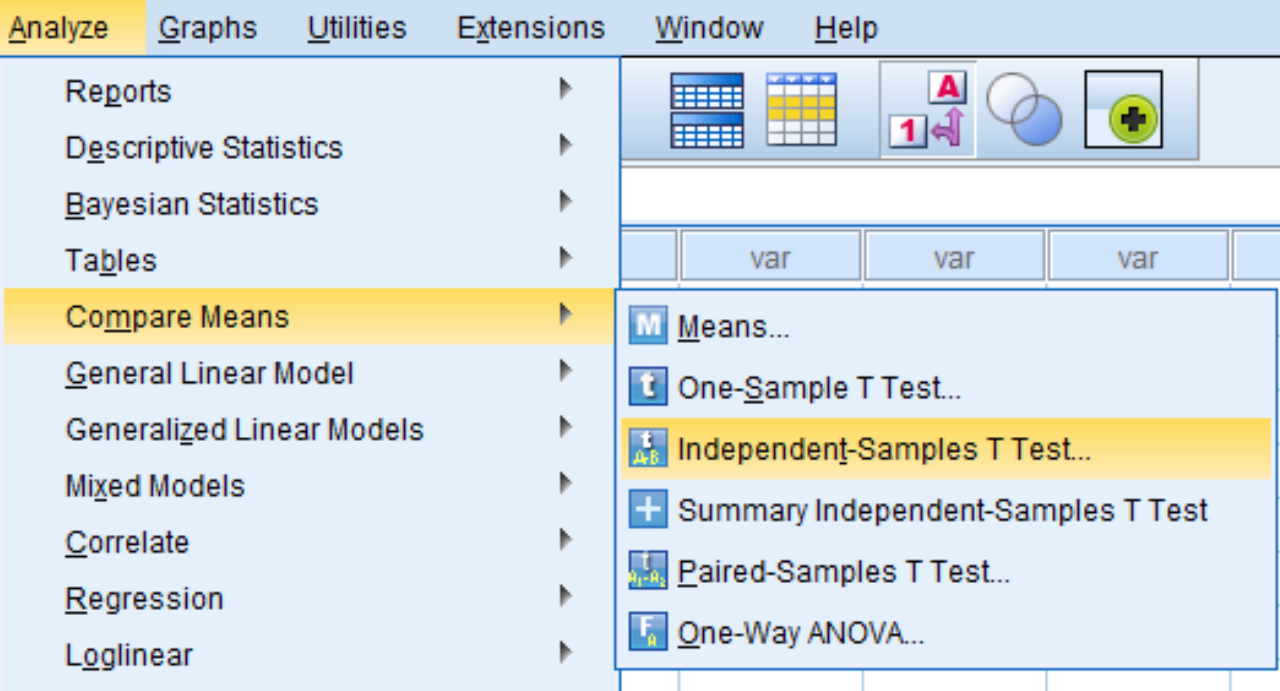
Pengambilan keputusan :

- Jika probabilitas > 0,05 ; maka Ho diterima
- Jika probabilitas < 0,05 ; maka Ho ditolak

# Uji Normalitas Distribusi Data

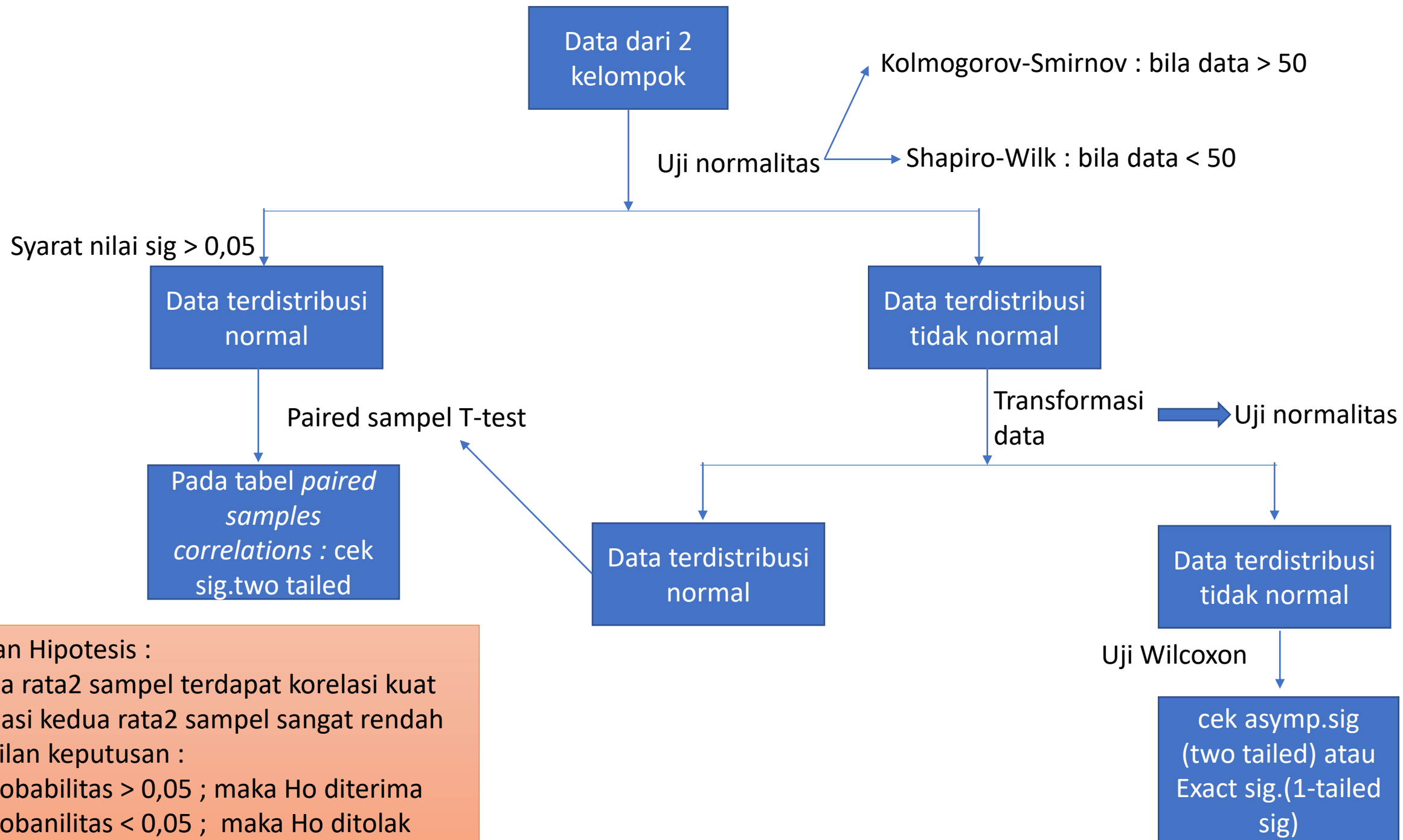
- Analyze → Descriptive statistics → Explore → Plots → Checklist Normality plots → Continue → OK





## 2. *Paired T-test*

- merupakan uji T utk 2 sampel yg berpasangan (paired)
- Dua sampel yg berpasangan artinya sebuah sampel dg subjek yg sama namun mengalami perlakuan atau pengukuran yg berbeda
- Asumsi uji T berpasangan : populasi-populasi yg diuji berdistribusi normal, tdk perlu dilakukan pengujian homogenitas varian (krn subjeknya sama)



Perumusan Hipotesis :

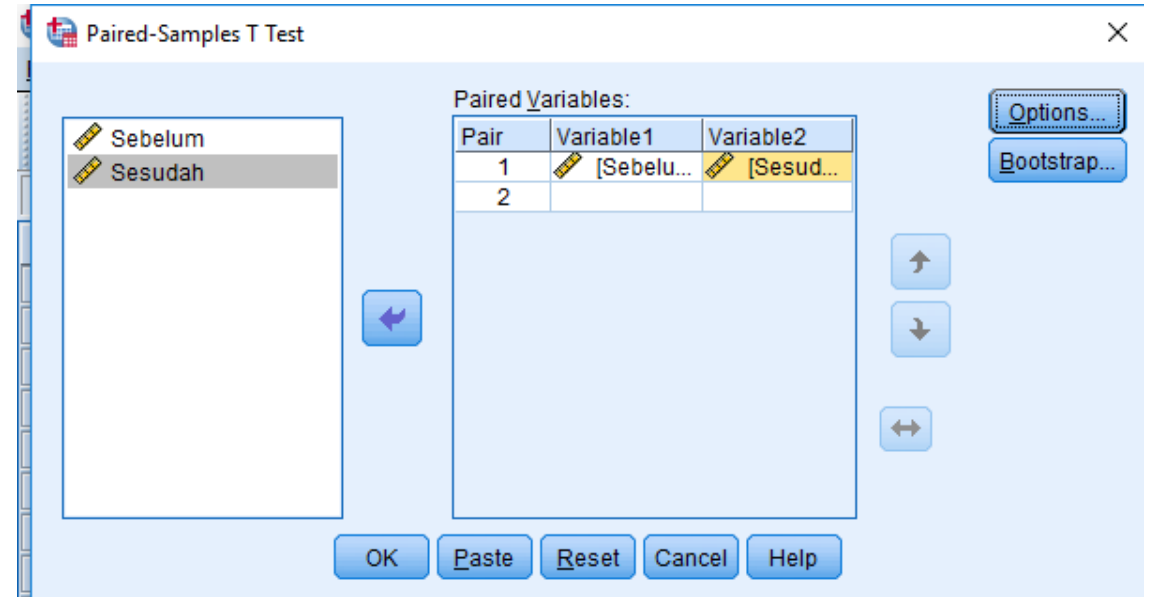
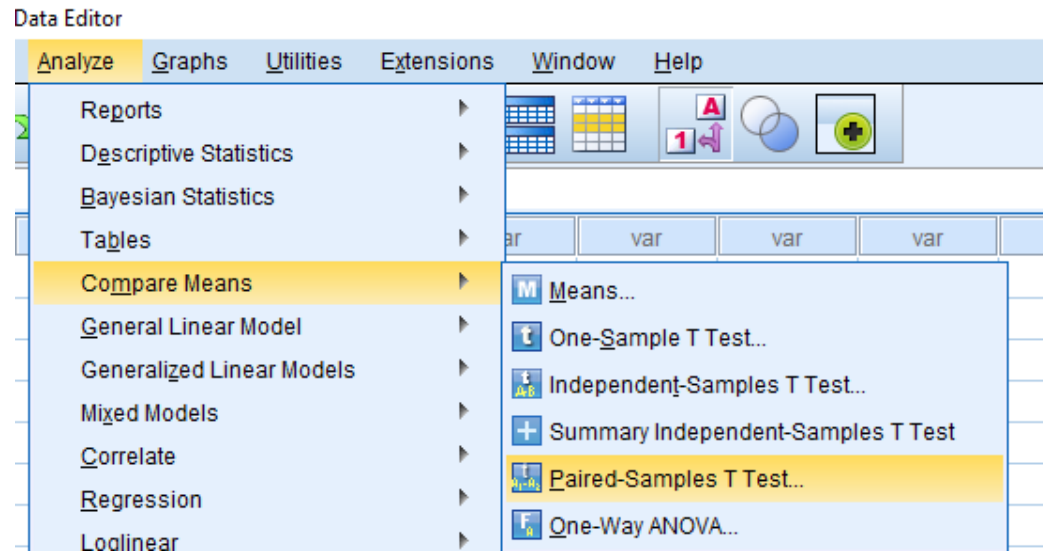
Ho : kedua rata2 sampel terdapat korelasi kuat

H1 : korelasi kedua rata2 sampel sangat rendah

Pengambilan keputusan :

- Jika probabilitas > 0,05 ; maka Ho diterima
- Jika probabilitas < 0,05 ; maka Ho ditolak

Sebelum	Sesudah
130	110
133	109
131	106
134	103
130	107
130	105
129	103
129	112
131	103
134	109
130	110
129	104
131	108
133	110
130	107
129	112
130	109
129	104
131	109
129	105





### 3. *One sample T-test*

- Metode uji ini menguji apakah suatu nilai tertentu (nilai pembandingan) berbeda bermaksa atau sama dengan nilai rata-rata sebuah sampel populasi

Kadar PCT

499

501

502

498

500

501

499

495

502

499

503

500

498

497

501

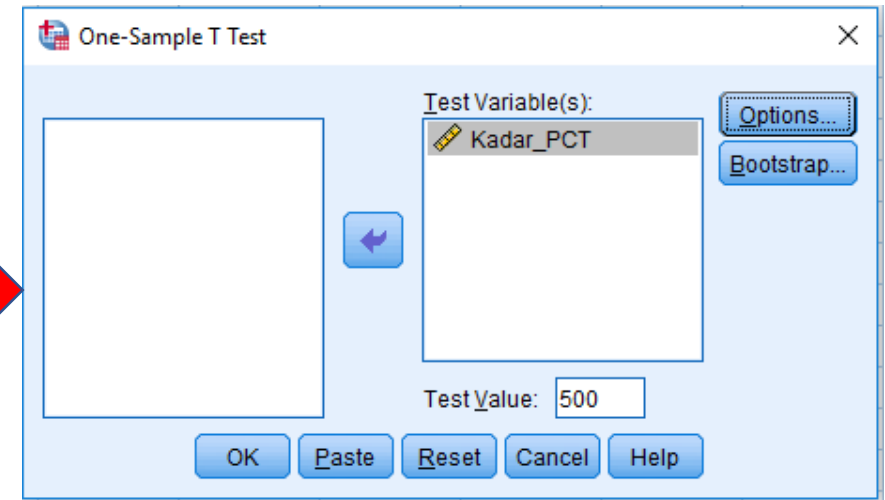
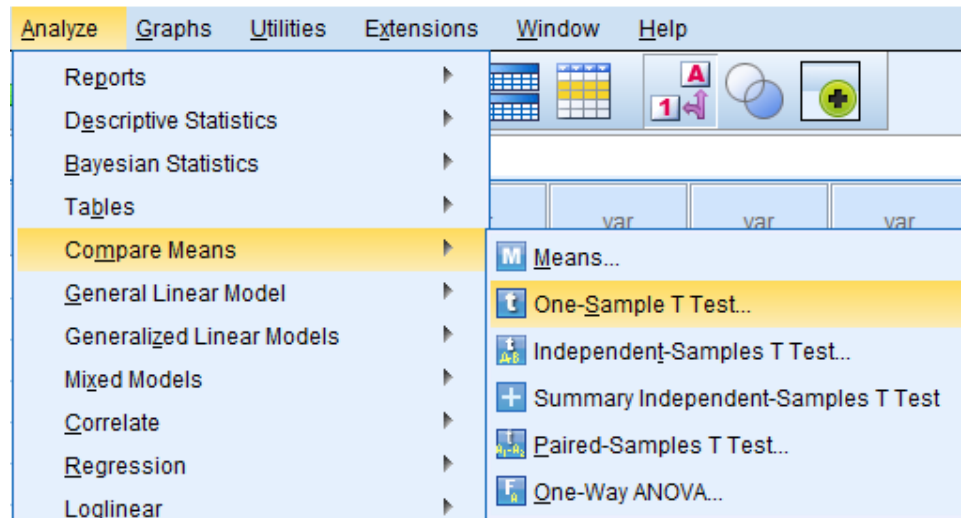
500

498

502

499

500

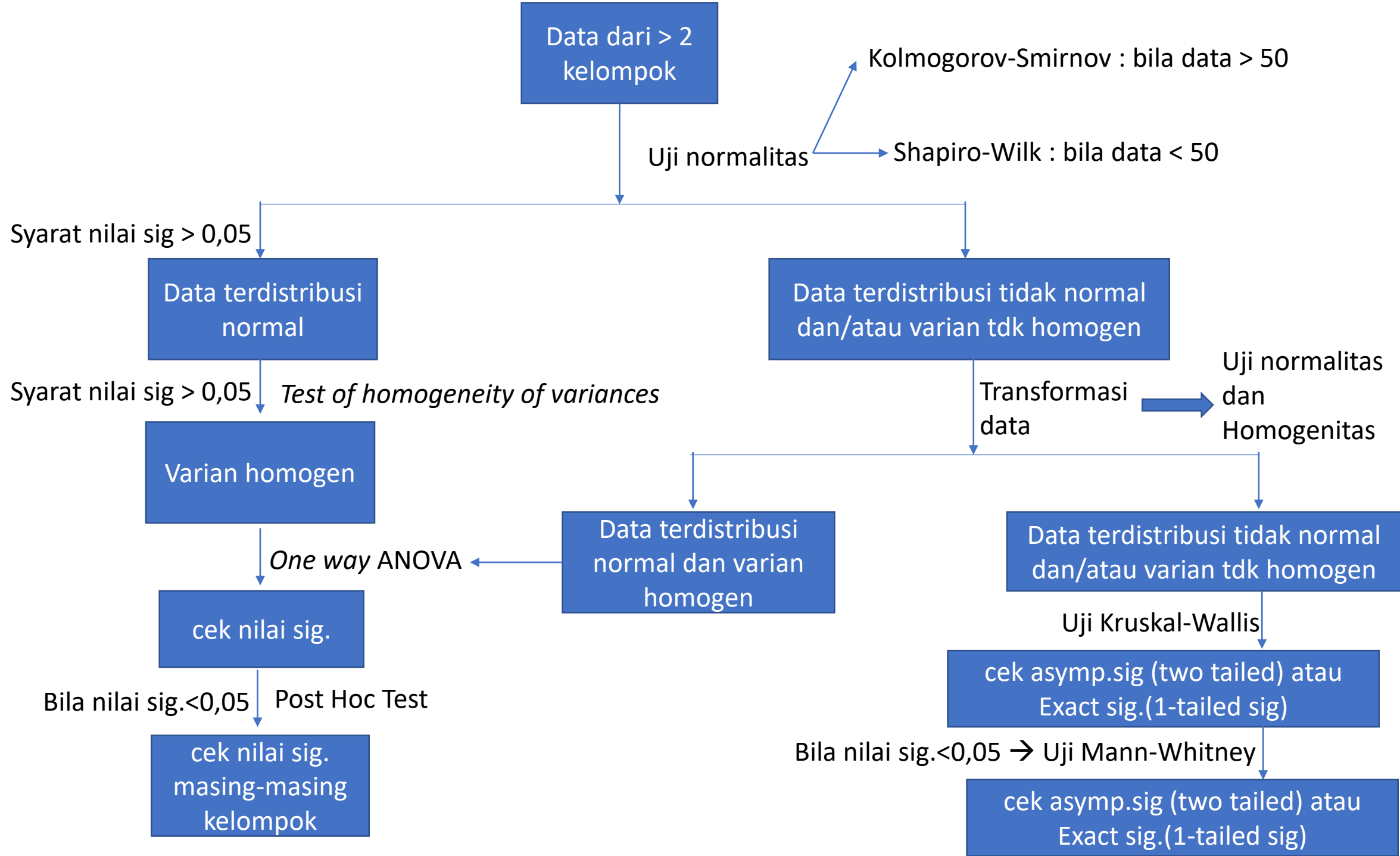


## 4. Analisa varian (*Analysis of variance*)

- Metode ini digunakan utk pengujian perbedaan rata-rata dari lebih dari 2 sampel yang tdk berpasangan.
- Asumsi : populasi-populasi yg diuji berdistribusi normal, varian dari populasi-populasi tsb sama, sampel tdk berhubungan satu dg yg lain.
- Jenis Analisa Varian

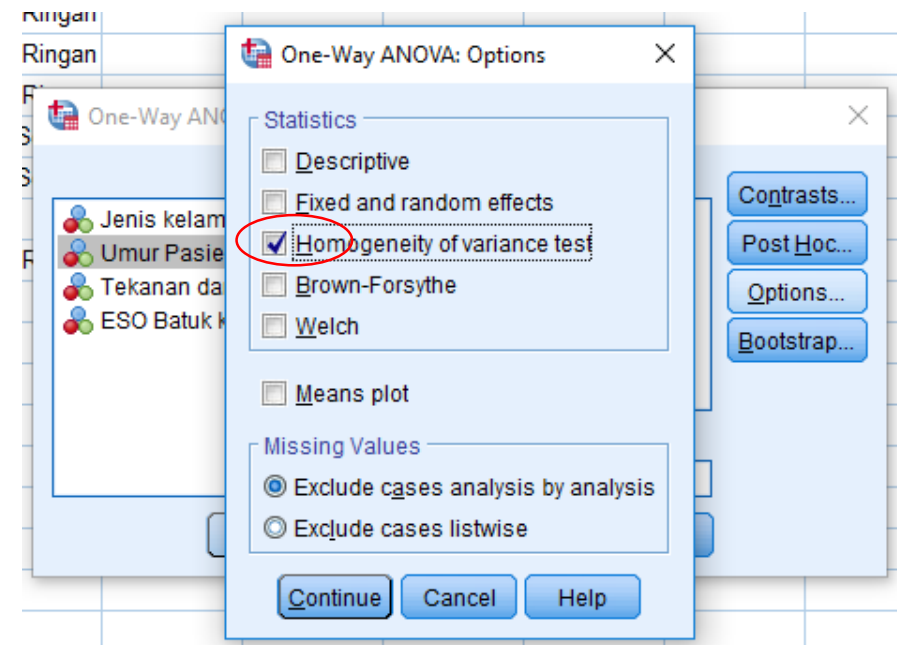
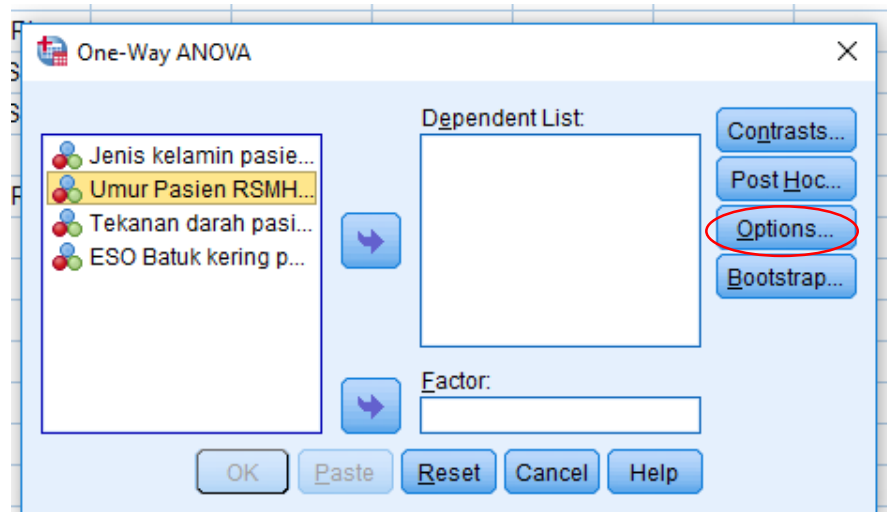
Jumlah Variabel Bebas	Jumlah Variabel Terikat	Jenis Analisa
1	1	One way ANOVA
2	1	Two way ANOVA

Perlakuan	%Daya Analgetik %
1	35.54
1	36.87
1	36.55
1	35.98
1	35.65
2	40.78
2	42.34
2	43.89
2	40.67
2	41.98
3	45.49
3	47.76
3	49.27
3	45.98
3	45.49



# Uji Homogenitas varian

- Analyze → Compare mean → One way ANOVA → Options → Checklist Homogeneity of variance test → continue → OK



# Two way ANOVA

Konsentrasi Ekstrak (ppm)	Persen Kematian Larva			
	Ekstrak N-Heksan	Ekstrak Etilasetat	Ekstrak etanol residu	Ekstrak kasar etanol
31.25	10	20	20	50
	10	20	10	40
	0	0	20	30
62.5	20	40	40	50
	10	30	30	60
	10	20	50	50
125	10	40	50	70
	20	40	60	70
	20	50	60	80
250	20	60	70	90
	30	50	70	70
	20	50	70	80
500	30	70	80	90
	30	70	80	80
	20	60	70	100

### Tests of Normality

Jenis_Ekstrak	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk			
	Statistic	df	Sig.	Statistic	df	Sig.	
Persen_Kematian_Larva	N-Heksan	.219	15	.052	.888	15	.063
	Etil asetat	.140	15	.200 <sup>*</sup>	.951	15	.539
	Etanol residu	.183	15	.191	.907	15	.120
	Ekstrak kasar	.153	15	.200 <sup>*</sup>	.962	15	.732

\*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

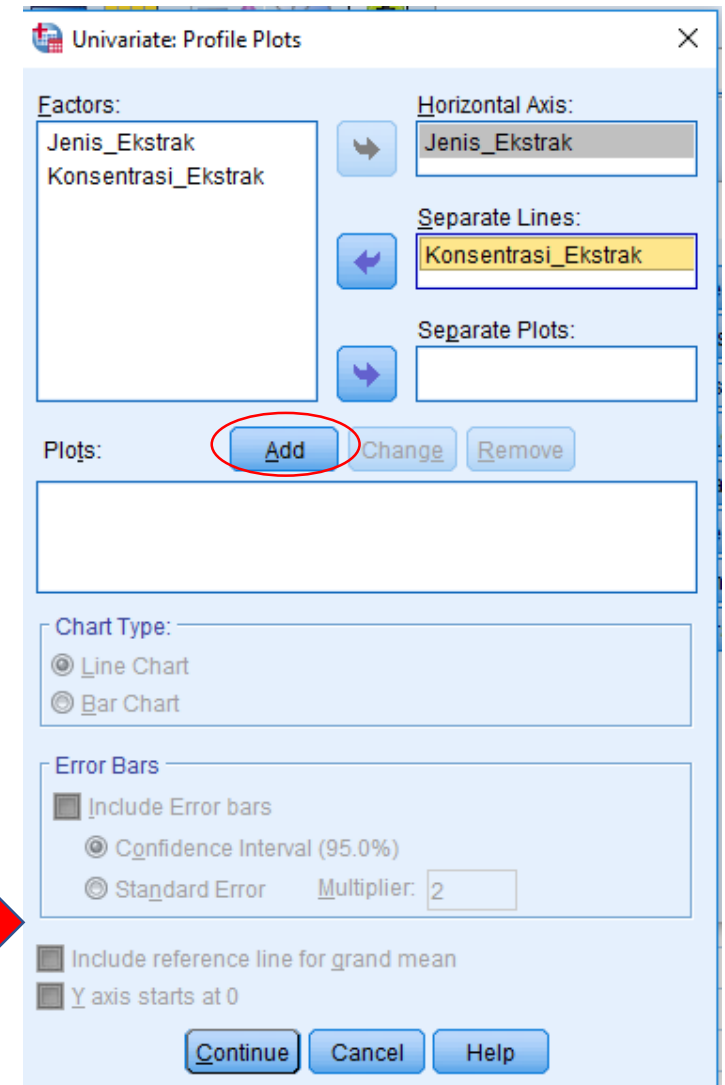
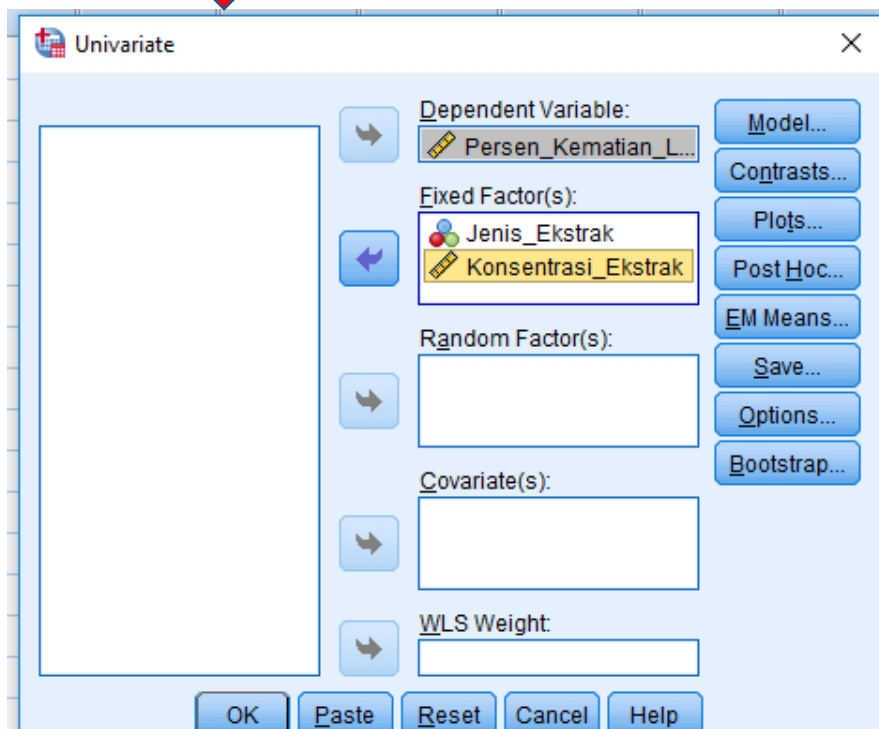
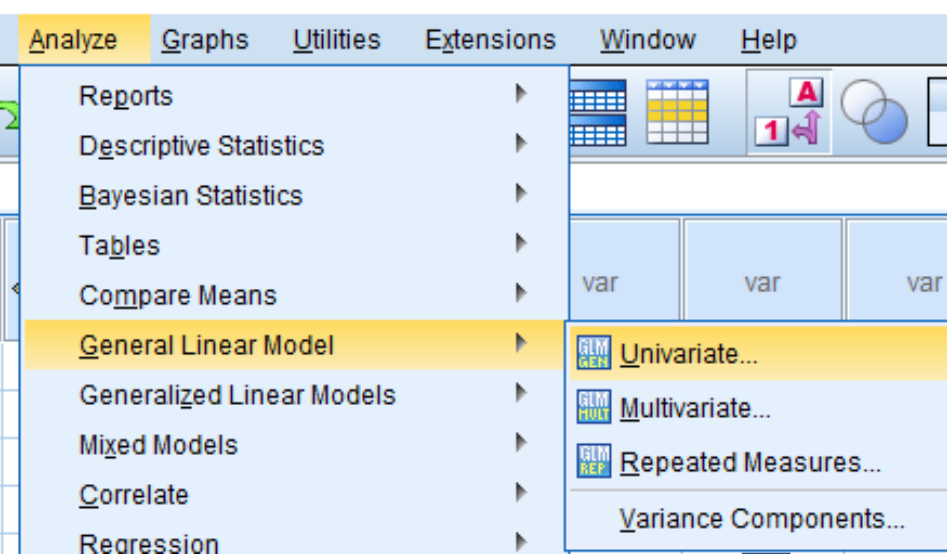
### Tests of Normality

Konsentrasi_Ekstrak	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk			
	Statistic	df	Sig.	Statistic	df	Sig.	
Persen_Kematian_Larva	31.25	.228	12	.085	.920	12	.286
	62.5	.161	12	.200 <sup>*</sup>	.933	12	.412
	125	.142	12	.200 <sup>*</sup>	.948	12	.603
	250	.218	12	.120	.908	12	.201
	500	.245	12	.046	.892	12	.125

\*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction





Univariate: Post Hoc Multiple Comparisons for Observed Means

Factor(s):  
Jenis\_Ekstrak  
Konsentrasi\_Ekstrak

Post Hoc Tests for:  
Jenis\_Ekstrak  
Konsentrasi\_Ekstrak

Equal Variances Assumed

LSD  S-N-K  Waller-Duncan  
 Bonferroni  Tukey Type I/Type II Error Ratio: 100  
 Sidak  Tukey's-b  Dunnett  
 Scheffe  Duncan Control Category: Last  
 R-E-G-W-F  Hochberg's GT2 Test  
 R-E-G-W-Q  Gabriel  2-sided  < Control  > Control

Equal Variances Not Assumed

Tamhane's T2  Dunnett's T3  Games-Howell  Dunnett's C

Continue Cancel Help

Univariate: Options

Display

Descriptive statistics  Homogeneity tests  
 Estimates of effect size  Spread vs. level plot  
 Observed power  Residual plot  
 Parameter estimates  Lack of fit  
 Contrast coefficient matrix  General estimable function

Heteroskedasticity Tests

Modified Breusch-Pagan test  F test  
Model... Model...  
 Breusch-Pagan test  White's test  
Model...

Parameter estimates with robust standard errors

HC0  
 HC1  
 HC2  
 HC3  
 HC4

Significance level: .05 Confidence intervals are 95.0 %

Continue Cancel Help

Univariate: Estimated Marginal Means

Estimated Marginal Means

Factor(s) and Factor Interactions:  
(OVERALL)  
Jenis\_Ekstrak  
Konsentrasi\_Ekstrak  
Jenis\_Ekstrak\*Konsentrasi\_Eks

Display Means for:  
Jenis\_Ekstrak  
Konsentrasi\_Ekstrak  
Jenis\_Ekstrak\*Konsentrasi\_Ek

Compare main effects

Confidence interval adjustment:  
LSD(none)

Continue Cancel Help

## Cek Homogenitas Varian

### Levene's Test of Equality of Error Variances<sup>a,b</sup>

		Levene Statistic	df1	df2	Sig.
Persen_Kematian_Larva	Based on Mean	.798	19	40	.696
	Based on Median	.275	19	40	.998
	Based on Median and with adjusted df	.275	19	28.471	.998
	Based on trimmed mean	.749	19	40	.747

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: Persen\_Kematian\_Larva

b. Design: Intercept + Jenis\_Ekstrak + Konsentrasi\_Ekstrak + Jenis\_Ekstrak \* Konsentrasi\_Ekstrak

### Tests of Between-Subjects Effects

Dependent Variable: Persen\_Kematian\_Larva

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	37751.667 <sup>a</sup>	19	1986.930	37.255	.000
Intercept	118815.000	1	118815.000	2227.781	.000
Jenis_Ekstrak	19885.000	3	6628.333	124.281	.000
Konsentrasi_Ekstrak	15910.000	4	3977.500	74.578	.000
Jenis_Ekstrak * Konsentrasi_Ekstrak	1956.667	12	163.056	3.057	.004
Error	2133.333	40	53.333		
Total	158700.000	60			
Corrected Total	39885.000	59			

a. R Squared = .947 (Adjusted R Squared = .921)

**Jenis\_Ekstrak**

**Multiple Comparisons**

Dependent Variable: Persen\_Kematian\_Larva  
Tukey HSD

(I) Jenis_Ekstrak	(J) Jenis_Ekstrak	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
N-Heksan	Etil asetat	-24.00*	2.667	.000	-31.15	-16.85
	Etanol residu	-34.67*	2.667	.000	-41.81	-27.53
	Ekstrak kasar	-50.00*	2.667	.000	-57.15	-42.85
Etil asetat	N-Heksan	24.00*	2.667	.000	16.85	31.15
	Etanol residu	-10.67*	2.667	.001	-17.81	-3.53
	Ekstrak kasar	-26.00*	2.667	.000	-33.15	-18.85
Etanol residu	N-Heksan	34.67*	2.667	.000	27.52	41.82
	Etil asetat	10.67*	2.667	.001	3.52	17.82
	Ekstrak kasar	-15.33*	2.667	.000	-22.48	-8.18
Ekstrak kasar	N-Heksan	50.00*	2.667	.000	42.85	57.15
	Etil asetat	26.00*	2.667	.000	18.85	33.15
	Etanol residu	15.33*	2.667	.000	8.19	22.48

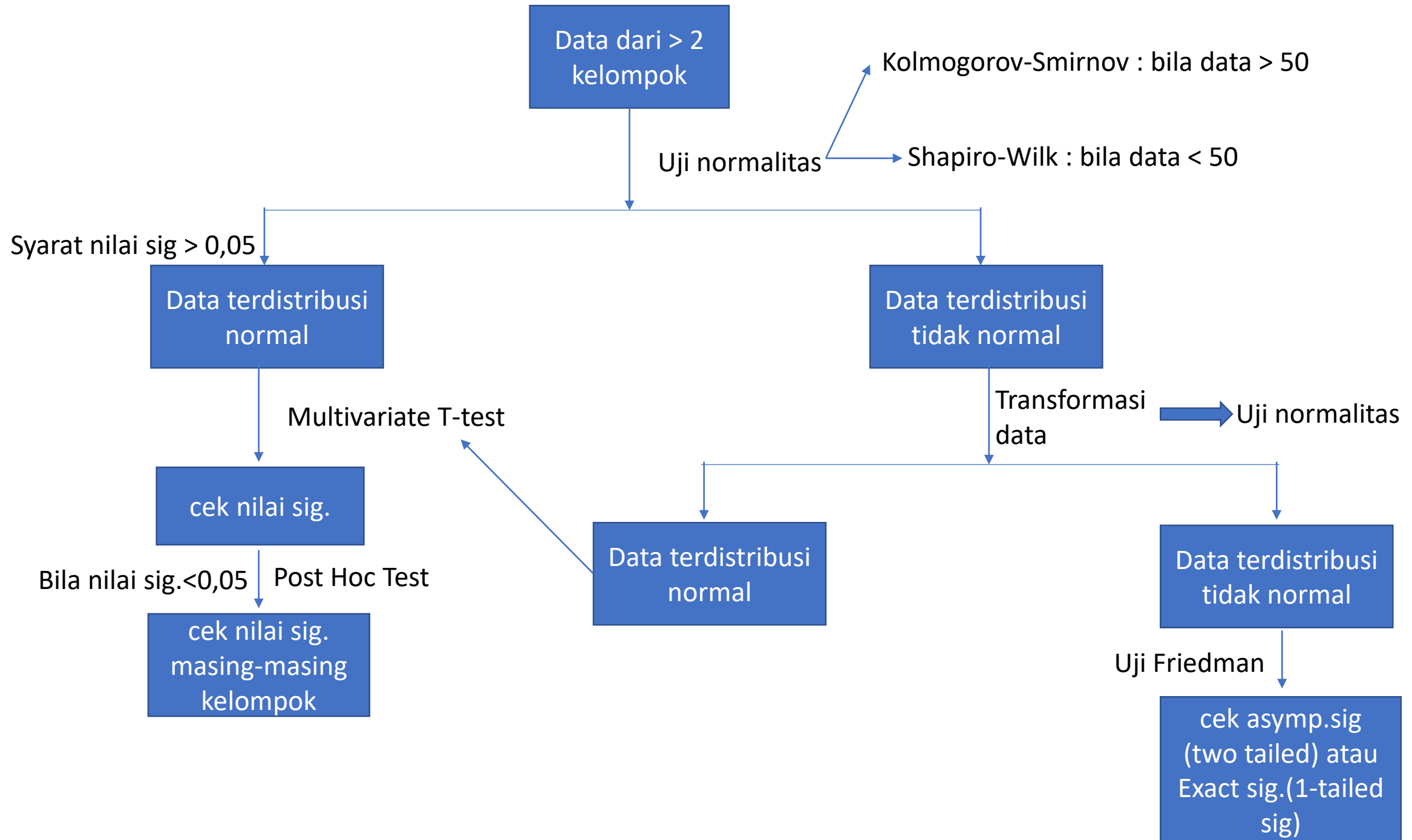
Based on observed means.  
The error term is Mean Square(Error) = 53.333.  
\*. The mean difference is significant at the ,05 level.

Dependent Variable: Persen\_Kematian\_Larva  
Tukey HSD

(I) Konsentrasi_Ekstrak	(J) Konsentrasi_Ekstrak	Mean Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
31.25	62.5	-15.00*	2.981	.000	-23.52	-6.48
	125	-28.33*	2.981	.000	-36.85	-19.82
	250	-37.50*	2.981	.000	-46.02	-28.98
	500	-45.83*	2.981	.000	-54.35	-37.32
62.5	31.25	15.00*	2.981	.000	6.48	23.52
	125	-13.33*	2.981	.001	-21.85	-4.82
	250	-22.50*	2.981	.000	-31.02	-13.98
	500	-30.83*	2.981	.000	-39.35	-22.32
125	31.25	28.33*	2.981	.000	19.82	36.85
	62.5	13.33*	2.981	.001	4.82	21.85
	250	-9.17*	2.981	.029	-17.68	-.65
	500	-17.50*	2.981	.000	-26.02	-8.98
250	31.25	37.50*	2.981	.000	28.98	46.02
	62.5	22.50*	2.981	.000	13.98	31.02
	125	9.17*	2.981	.029	.65	17.68
	500	-8.33	2.981	.058	-16.85	.18
500	31.25	45.83*	2.981	.000	37.32	54.35
	62.5	30.83*	2.981	.000	22.32	39.35
	125	17.50*	2.981	.000	8.98	26.02
	250	8.33	2.981	.058	-.18	16.85

## 5. *Repeated ANOVA*

- Metode ini digunakan untuk pengujian perbedaan rata-rata dari lebih dari 2 sampel yg berpasangan.
- Asumsi : populasi-populasi yg diuji berdistribusi normal, tidak perlu dilakukan pengujian homogenitas varian (karena subjeknya berpasangan atau sama)



Responden	Berat Badan		
	Awal	Seminggu	Sebulan
1	90.4	90.3	86.3
2	86.5	84	81.4
3	85.4	84.3	80.8
4	95.3	93.5	92.5
5	70.6	70.6	67.5
6	75.2	74.5	74
7	90.9	90.4	84.3
8	64.7	63.7	62.2
9	71.5	70.2	65.6
10	95.3	94	88.2
11	85.5	85.4	82.7
12	85.3	84.8	80.8
13	97.2	97.1	94.3
14	84.5	83.6	80.7
15	77.7	77.5	76.1
16	63.5	62.9	60.2
17	81.3	81	78.3

Tests of Normality						
	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
BB_Awal	.168	17	.200 <sup>*</sup>	.943	17	.359
BB_Seminggu	.163	17	.200 <sup>*</sup>	.947	17	.408
BB_Sebulan	.172	17	.192	.950	17	.458

\*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Analyze Graphs Utilities Extensions Window Help

- Reports
- Descriptive Statistics
- Bayesian Statistics
- Tables
- Compare Means
- General Linear Model**
  - Univariate...
  - Multivariate...
  - Repeated Measures...**
  - Variance Components...
- Generalized Linear Models
- Mixed Models
- Correlate
- Regression

### Repeated Measures

Within-Subjects Variables (Waktu):

- BB\_Awal(1,Obat\_Pelan...
- BB\_Seminggu(2,Obat\_...
- BB\_Sebulan(3,Obat\_Pel...

Between-Subjects Factor(s):

Covariates:

Model...  
Contrasts...  
Plots...  
Post Hoc...  
EM Means...  
Save...  
Options...

OK Paste Reset Cancel Help

### Repeated Measures Define Factor(s)

Within-Subject Factor Name: Waktu

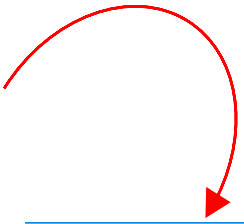
Number of Levels: 3

Add Change Remove

Measure Name: Obat\_Pelangsing

Add Change Remove

Define Reset Cancel Help



### Repeated Measures: Profile Plots

Factors: Waktu

Horizontal Axis: Waktu

Separate Lines:

Separate Plots:

Plots: Add Change Remove

Chart Type:

- Line Chart
- Bar Chart

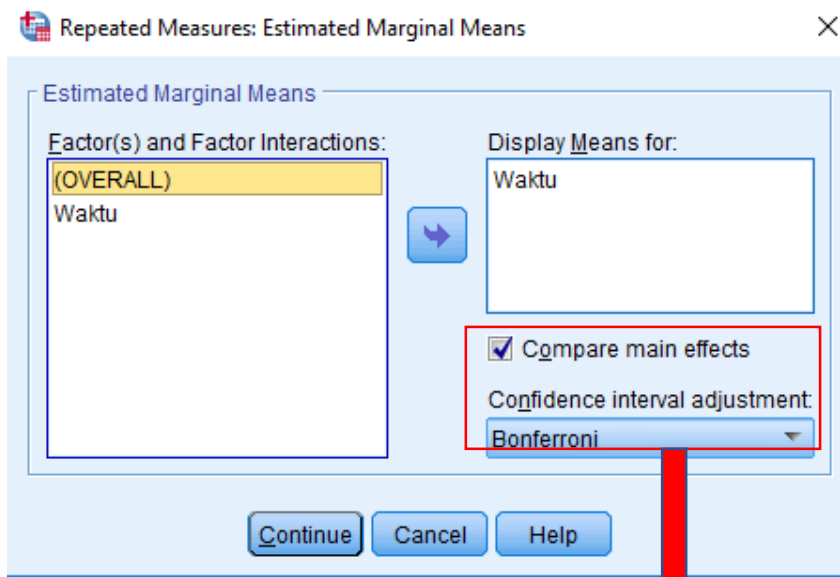
Error Bars

- Include Error bars
  - Confidence Interval (95.0%)
  - Standard Error Multiplier: 2
- Include reference line for grand mean
- Y axis starts at 0

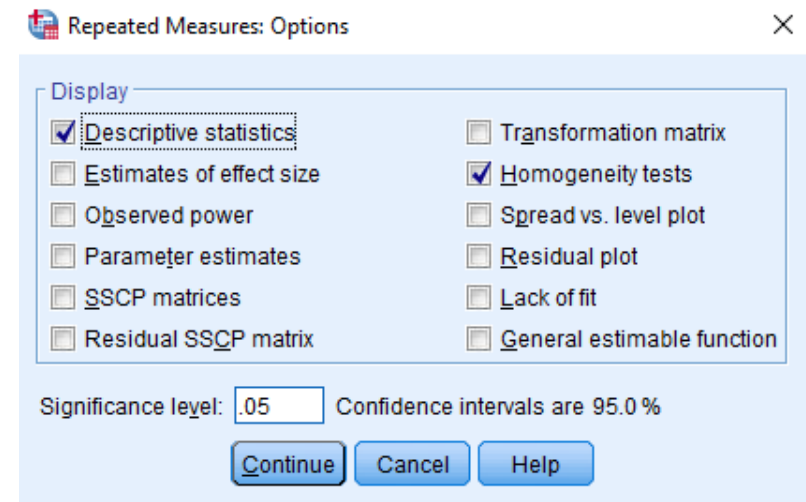
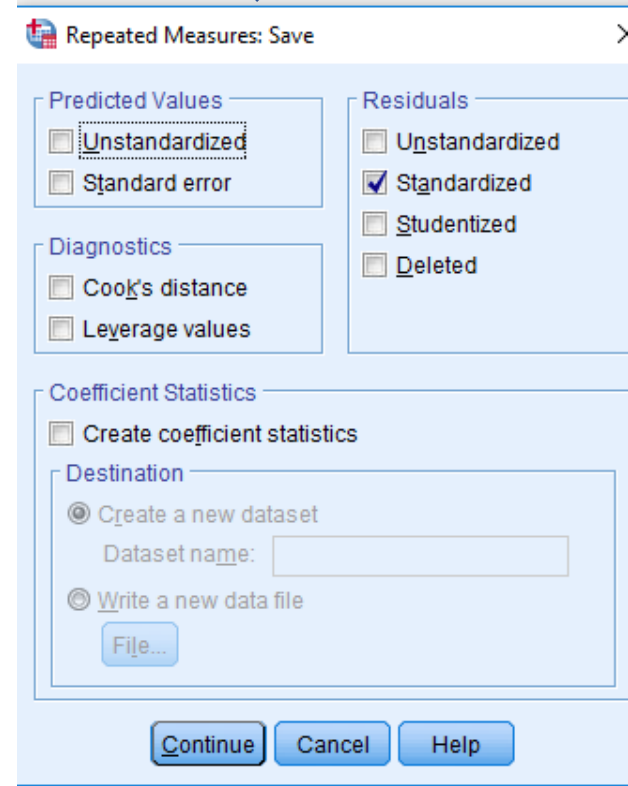
Continue Cancel Help







Untuk Uji Post Hoc



# Homogeneity test

## Mauchly's Test of Sphericity<sup>a</sup>

Measure: Obat\_Pelangsing

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon <sup>b</sup>		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Waktu	.428	12.727	2	.002	.636	.666	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: Waktu

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

## Tests of Within-Subjects Effects

Measure: Obat\_Pelangsing

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Waktu	Sphericity Assumed	138.718	2	69.359	75.028	.000
	Greenhouse-Geisser	138.718	1.272	109.028	75.028	.000
	Huynh-Feldt	138.718	1.333	104.079	75.028	.000
	Lower-bound	138.718	1.000	138.718	75.028	.000
Error(Waktu)	Sphericity Assumed	29.582	32	.924		
	Greenhouse-Geisser	29.582	20.357	1.453		
	Huynh-Feldt	29.582	21.325	1.387		
	Lower-bound	29.582	16.000	1.849		

## Pairwise Comparisons

Measure: Obat\_Pelangsing

(I) Waktu	(J) Waktu	Mean Difference (I-J)	Std. Error	Sig. <sup>b</sup>	95% Confidence Interval for Difference <sup>b</sup>	
					Lower Bound	Upper Bound
1	2	.765 <sup>*</sup>	.166	.001	.322	1.207
	3	3.818 <sup>*</sup>	.400	.000	2.748	4.887
2	1	-.765 <sup>*</sup>	.166	.001	-1.207	-.322
	3	3.053 <sup>*</sup>	.373	.000	2.057	4.049
3	1	-3.818 <sup>*</sup>	.400	.000	-4.887	-2.748
	2	-3.053 <sup>*</sup>	.373	.000	-4.049	-2.057

Based on estimated marginal means

\*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.