* If the probability is 0.01 and α = 0.05

p value is smaller 🡪 significant data🡪 reject the null hypothesis

and accept the research .

* The probability can't be a minus value

 Probabilities can be no less than 0% and no more than 100%

* The probability of an even is less than 100% of the probability of the opposite event .

|  |
| --- |
| **Probability Of An Event** |
|

|  |  |
| --- | --- |
| P(A) =  | The Number Of Ways Event A Can Occur \* 100% |
| The total number Of Possible Outcomes |

 |

* The result in the research report is described by the probability ( P value ) not by using α ;

Eg : the probability to have a patient with hematoma due to the use of heparin is 0.04 🡪 4 patients out of each 100 patient taking heparin will have a hematoma .

And that’s a significant result if we compare it with α as a cut of point

* the probability value ( P value ) is the observed data that’s consistent with null hypothesis

the Null hypothesis : متهم بريء حتى تثبت إدانته

P <α : ثبتت ادانته REJECT THE NULL

P> α : لا يوجد عليه ادله (براءة ) ACCEPT THE NULL

In another words :

* The p-value is basically the probability of obtaining your sample data IF the null hypothesis were true. So if you obtain a p-value of 0.85, then you have little reason to doubt the null hypothesis. However, if your p-value is say 0.02, there’s only a very small chance you would have obtained that data if the null hypothesis was in fact true.
* ***Confidence level + alpha = 1***

If alpha equals 0.05, then your confidence level is 0.95 If you increase alpha, you both increase the probability of incorrectly rejecting the null hypothesis and also decrease your confidence level.

* Null hypothesis (statistical hypothesis ) : proposes that there's No relationship ,No difference No effect ,No impact , among the variables of interest.
* Eg : No relation between hematoma formation and heparin intake.

Q : If α = 0.05 , P value = 0.03 is this a significant data ?? Yes

* If the statistical significance relationship is found , p value is equal or less than 0.05 🡪 the null hypothesis should be rejected ,and the research hypothesis should be accepted
* If NO statistical significance relationship is found , p value is more than 0.05 🡪 the null hypothesis should be accepted

The Alternative hypothesis ( research hypothesis ) is the opposite of the null hypothesis and symbolized as H1 or HA .

Sample error :

Type1 error : worse than type 2 and described to be like "اعدام متهم بريء"

* detecting an effect that is not present

Type2 error : "اطلاق سراح متهم مذنب"

* failing to detect an effect that is present

example :

in an RCT study ;

research hypothesis : Flucloxacillin has higher effectiveness than amoxicillin

if the sample was **not examined well** and the P value was calculated to be less than 0.05 , you'll accept the research hypothesis and start giving the patients Flucloxacillin , so they'll develop resistance to certain kinds of bacteria ; negative effect on the patients(unethical)

 ( where in reality your result is false (type1 error )

* statistical inference : the main core/key the researcher depend on all the time

Dentists should be aware when trying new products , that this products should be supported by a top evidence (multicentre RCT with large sample size )

significance level α : we use it as standard comparison value with the p value

α ranges from 0-1

P value ranges from 0-100%

So a small P value ; 0.001 provides a strong evidence against the null hypothesis ( indicates that getting such a result could occur in 1 out of 1000 times )

* Whenever you do RCT study :
1. State the null hypothesis
2. Choose appropriate statistics
3. Define the degree of risk in correct the concluding null hypothesis
4. Calculate statistics
5. Decide ( depending on P value )
* The tail of α is mainly 0.05 but in very specific RCT you have to choose a more significant value like 0.001 or 0.00001 according to the direction of your hypothesis

 Degree of freedom ; the doctor said it's not important

Confidence interval( CI ) calculations ( very important )

* If you want to calculate 95% Confidence interval ;

The 95% CI = **mean ± 1.96\*SE**

**SE🡪 the standard error**

**1.96🡪represents the standard deviation**

**Mean🡪 of the sample**

* 99% CI = **mean ± 2.58\*SE**

**Example :**

thedoctor showed tables (for a statistical evidence) that shows values related to the use of heparin and the formation of hematoma

* These values are descriptive ( you could think by looking at them that all patient taking heparin will have hematoma ) which is not statistically true
* So you have to examine data utilizing statistical inference;
1. State the null hypothesis (there is NO relationship between the prophylactic anticoagulant heparin and hematoma formation )
2. α level 🡪 0.05 (( this result is significant using Fisher's exact test at alpha 0.05 to tail ))

if P value was calculated to be 0.031

1. decide ( compare P value with α )

p value is smaller 🡪 reject the null hypothesis

= there's statistically a significant relationship between the prophylactic anticoagulant heparin and hematoma formation

Example :

1. Null hypothesis : there's no relationship between smoking and bleeding post mammoplasty
2. α level 🡪 0.05
3. P value=0.33

P value is larger 🡪 accept the null hypothesis

So theres no relationship between smoking and bleeding post mammoplasty

Example :

Examine if there's a relationship between the age of the patient and hematoma formation

We use the same tips

Final result : No relationship (accept the null )

The doctor discussed values provided in tables to figure out which variables affect the hematoma formation (total mass , duration of the operation,…)

I'm sorry for any mistake, don’t hesitate to correct me .

Good luck

Hadeel Aljarhi