

BASIC STATISTICS IN MEDICAL PRACTICE

Pages with reference to book, From 141 To 142

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NON-PARAMETRIC TESTS

Analysis of data do not conform to a normal distribution. Tests have been devised specially for situations where we do not wish to make any assumption about the nature of the distribution¹. They are known as non-parametric tests. There are two tests which are widely used, the Wilcoxon's rank and sum test which is applied on paired data and Mann-Whitney U test which is applied on unpaired data.

TABLE I. Wilcoxon test of significance of difference between results (on a plasma globulin fraction) of treating two groups of patients in matched pair.

Pairs of treatment (1)	Treatment		Difference (4)	Rank (5)	Signed rank (6)
	A (2)	B (3)			
1	38	45	-7	6 & 1/2	-6 & 1/2
2	26	28	-2	2 & 1/2	-2 & 1/2
3	29	27	+2	2 & 1/2	+2 & 1/2
4	41	38	+3	4	+4
5	36	40	-4	5	-5
6	31	42	-11	9	-9
7	32	39	-7	6 & 1/2	-6 & 1/2
8	30	39	-9	8	-8
9	35	34	+1	1	+1
10	33	45	-12	10	-10

The table I below shows the plasma concentrations of globulin fractions of 10 pairs of patients after treatment A and B (Paired data)¹. In columns (2) and (3) the globulin fraction after treatment A and B are given. Differences in each pair are shown in column (4). The fifth column contains ranks of differences. The smallest difference is given rank one, when two or more differences are identical then each is allotted the half way point between the ranks. The ranks having plus sign and those having minus sign are added separately and the smaller total is used and it is referred to table against the number of pairs. Rank totals larger than those in the table are non significant. In this particular case "Wilcoxon test on paired sample 5% levels of P, critical point of rank sums is 8 against 10 pairs"¹ therefore 8 is greater than the total plus ranks 7 & 1/2, and thus this result is just significant at P < 0.05. The observation in the two samples are combined into a single series and ranked in order; but, in the ranking, the figures from one sample must be distinguished from other. The ranks of the two samples are added separately and smaller sum is used for reference to table II.

TABLE II. Wilcoxon test of significance of difference between results (on plasma globulin fraction) of treating two unpaired groups of patients, figures for sample B are marked*.

Globulin fraction		Globulin fraction	
g/l	Rank	g/l	Rank
26	1	36	11
*27	2	38	12 & 1/2
*28	3	*38	12 & 1/2
29	4	*39	14 & 1/2
30	5	*39	14 & 1/2
31	6	*40	16
32	7	*41	17
33	8	*42	18
*34	9	*45	19 & 1/2
35	10	*45	19 & 1/2

Totals of ranks: sample A, 81.5; sample B, 128.5

The ranks of sample A is 81.5 and for sample B it is 128.5. In these particular cases “Wilcoxon test on unpaired sample 5% levels of P critical points of rank sums is 78 against n1 =10 & sample n2 =10 pairs¹” against this rank sums ranks of sample A is 81.5 & sample B is 128.5 is greater hence the results are not significant. It is worth noting that the same data when paired produce just significant results at 5% level and when unpaired a just non significant result is obtained. This disparity illustrates the value of pairing. Pairing leads to greater sensitivity of the test because it eliminates some confusing variables.

REFERENCE

1. Swinscow, T.D.V. Statistics at Square One. British Medical Association 1978: pp 58-61, 80-81.