CMED 305 Course

Practical Exercise on : Relative risk and Confounding

This practical exercise will be a revision on relative risk while we learn confounding.

We have already learnt that relative risk helps in identifying the risk of developing a disease in an exposed group versus risk of developing a disease in the non exposed group. While we learnt its formula as;

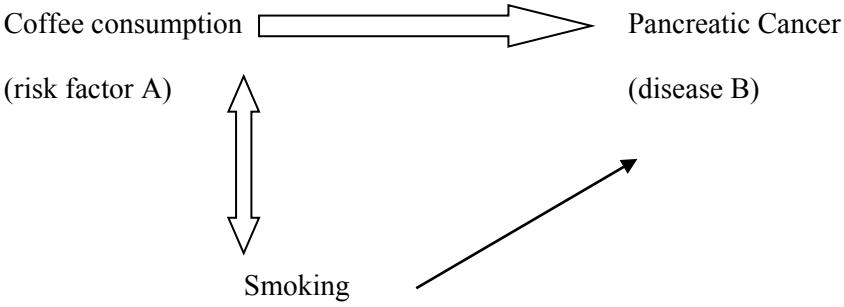
Relative risk = A/(A+B)/C/(C+D).

Let us learn the new term confounding in detail.

Confounding is a situation in which a measure of the effect of an exposure is distorted because of the association of exposure with other factor or factors that influence the outcome of interest.

It can be described as, Factor A is a risk factor for Disease B, X is a confounder if It is a risk factor for Disease B and is also associated with Factor A.

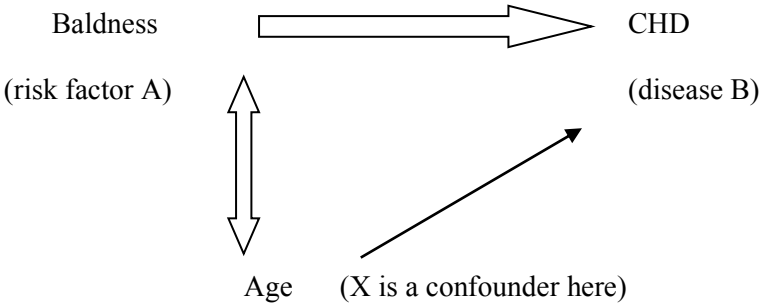
In the study of whether coffee consumption is a risk factor for pancreatic cancer, smoking is a confounder if: 1. It is a known risk factor for pancreatic cancer 2. It is associated with coffee drinking but is not a result of coffee drinking



(X is a confounder here)

Another hypothetical example can be considered to understand confounding in a step by step manner.

For instance, to study if baldness causes CHD in men, an epidemiological study recruited 10000 bald and 10000 hairy men and followed for 10 years to see for CHD.



Grouping the total subjects in 2*2 table;

	CHD Yes	CHD No	
Bald	775	9225	10000
Hairy	190	9810	10000
	965	19035	20000

We now calculate the RR associated with baldness;

RR = (775/10,000)/(190/10,000) = 4.08

So the risk of CHD in bald men is 4.08 times more than in hairy men. This is a strong association but can we say if this is due to causal relationship or due to confounding effect.

Now let's stratify and study the effect of age between old and young subjects.

Older subjects (aged greater than 65 years)

	CHD Yes	CHD No	
Bald	750	6750	7500
Hairy	100	900	1000
	850	7650	8500

RR in the older men: (750/7,500)/(100/1,000) = 1

Younger subjects (aged between 40 and 64 years)

	CHD Yes	CHD No	
Bald	25	2475	2500
Hairy	90	8910	9000
	115	11385	11500

RR in the younger men: (25/2,500)/(90/9,000) = 1

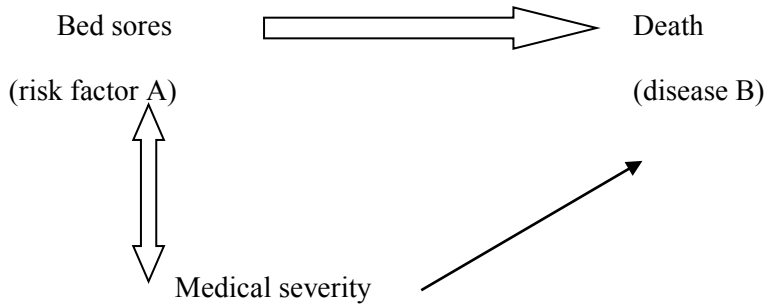
These results suggest that there is confounding by age since because when stratifying and adjusting for age the risk is changed. Had there been no effect from confounding then the risk would have been 4 even after stratifying.

Thus age is a confounder in this study.

Practical exercise

Scenario 1:

Let us illustrate yet another example of patients with bed sores and death for students to work out.



This study was carried out in 9400 patients among people aged 60 and above. Records of patients with and without bed sores were examined for outcome. The following data is grouped in the contingent table;

	Died Yes	Died No	
Bed sores Yes	79	745	824
Bed sores No	286	8290	8576
	365	9035	9400

Risk of bed sores and death in high medical severity group

	Died Yes	Died No	Total
Bed sores Yes	55	51	106
Bed sores No	5	5	10
	60	56	116

Bedsores and death in low medical severity group

	Died Yes	Died No	Total
Bed sores Yes	24	694	718
Bed sores No	281	8285	8566
	305	8979	9284

Calculate the risk and determine whether medical severity(high & low) is a confounder ?.

Scenario 2:

Let us consider another hypothetical example of confounder in a case control study discussing diabetes, CHD and age. The variable - age is a universal confounder and its effect shall be discussed subsequently.

Draw the diagram showing causal association between the variables. With the given data, determine, whether age(<40 & ≥ 40 is a confounder ?.

Diabetes	CHD Yes	CHD No
Yes	30	18
No	70	82
	100	100

Age	Exposed	Cases Yes	Cases No	
< 40	Yes	5	8	
	No	45	72	
≥40				
	Yes	25	10	
	No	25	10	