Risk factor and misleading factor

This article has been translated from WikiSkripta; the **translation** needs to be checked.
This article has been translated from WikiSkripta; the **formatting** needs to be checked.
This article has been translated from WikiSkripta; ready for the **editor's review**.

Risk factor

A risk factor (German *Risikofaktor*) is a factor of an individual, population, environment or nox that increases the risk of the onset, development or adverse course of a disease. Relative risk is usually used to quantify the degree of influence of a specific risk factor:

	Disease		
	Yes	**No**	**Total**
Unexposed	A	B	A+B
Exposed	C	D	C+D
Total	A+C	B+D	N = A+B+C+D

$$RR = A/(A+B) \div C/(C+D)$$

The importance of relative risk is obvious. It expresses how much more likely a person exposed to a given risk factor is to reach the observed state than a person who was not exposed to the given risk factor. A risk factor is only discussed if the relative risk is higher than one or 100%. If the relative risk is less than one, the studied factor represents a reduced risk of developing the given disease state; we then talk about the **protective factor**.

Risk factors are divided into **congenital** and **acquired** risk factors, however, from a clinical point of view, the division of risk factors into **controllable** and **non-controllable** factors is more important.

Typical **non-controllable** risk factors include:

- age: low age is a risk for e.g.: neuroblastomas, leukaemias, high for e.g.: Alzheimer's disease,
- sex: female sex is a risk factor for rheumatoid arthritis, male for the inguinal hernia,
- ethnicity: afroamericans tend to have higher risk of metabolic syndrome,
- genetic factors – e.g.: apolipoprotein **apo4** in Alzheimer's disease, or **HLAB27** in autoimmune diseases.

Typical **controllable** factors include:

- lifestyle factors: physical activity, eating habits, BMI, abuses, stress, etc.
- organism factors: hypertension, glycaemia, diuresis, etc.
- concurrent diseases: infections, bleeding disorders, bacteremia, septic conditions, metabolic disorders.

However, the mere existence of a relative risk is not proof that there is a real causal relationship between the studied factor and the given disease. A completely extreme case is the logical (self)deception ***post hoc ergo propter hoc*** (after this, therefore because of it), i.e. the assumption that a mere temporal connection unequivocally proves a causal connection. Especially when studying small data sets, even an independent factor can appear as risky, and vice versa only due to statistical fluctuations and possible methodological errors in the design of the investigation. While the previous sources of difficulty in assessing causality can in principle be detected and eliminated by thorough data analysis and possible study scale-up, a confounding factor can usually be detected only through insight into the pathogenesis of a particular disease.

Confounding factor

A ***confounding factor*** (German *Störfaktor*) is a factor that is linked to exposure to a risk or protective factor and to the development of a disease, but rather obscures the actual relationship between exposure and disease. A classic example, albeit a non-medical one, is the increase in the price of alcohol, which is a significant "risk factor" for the growth of priests' salaries - the misleading factor here is inflation. Another example can be a study of the effect of drinking black coffee on the risk of myocardial infarction. When looking at drinking only black coffee, the risk is quite high, but it mostly comes down to the misleading factor of smoking. Another quite frequent misleading factor is monitoring the protective factor of food for some diseases. For example, the great protective effect of chlorophyll on the development of colorectal cancer can be traced, the misleading factor here, given the usual form in which chlorophyll is taken, is fiber.

In principle, any factor can be used as a misleading factor, including age, sex, phase of the menstrual cycle, occupation, diet or even climatic conditions, therefore, when designing any study, the influence of misleading factors must be limited as much as possible. Limitation of influence can be done in several ways:

- rigorous randomization of a large population sample
- exclusion of all infividuals who differ significantly in a potential risk factor
- division of the population sample into groups with roughly equal values of potential confounding factors
- study of differences between paired individuals differing only in the studied factor and in all other characteristics as similar as possible
- assuming the influence of a number of factors during data analysis - multivariate analysis
- data standardization

Links

Related articles

- Relative risk
- Absolute risk
- Attributable risk
- Odds ratio