

## Research in Surgery: Understanding the Odds Ratio

Translated and Summarized by: Dr. Seyed Abbas Mirmalak

### Abstract:

The odds ratio (OR) serves as a statistical measure that quantifies the likelihood of an association between two characteristics within a designated population.<sup>2</sup>

### Introduction

The odds ratio is an essential metric for evaluating the impact of an exposure factor within a statistical framework. It is extensively employed in epidemiological research to examine the relationship between exposure to a risk factor—such as alcohol consumption—and the subsequent occurrence of a health outcome, such as oral and throat cancer.<sup>1,4-6</sup>

Specifically, the odds ratio delineates the degree of association between one characteristic (A) and its effect on the presence or absence of another characteristic (B).<sup>3</sup>

Researchers frequently utilize the odds ratio to investigate potential risk factors associated with various diseases.<sup>2,3</sup> For example, it can be applied to assess the correlation between alcohol consumption and the incidence of liver disease, or to ascertain whether regular consumption of red meat elevates the risk of colon cancer. Furthermore, the odds ratio may be utilized to explore potential relationships between mobile phone usage and brain cancer.<sup>3</sup> Formally, the odds ratio is defined as the ratio of individuals who have been exposed to a pathogenic or risk factor and subsequently developed the illness, in comparison to those who were exposed but did not develop the illness.<sup>8</sup>

\* Professor of General Surgery, Islamic Azad University of Medical Sciences, Tehran Branch

Received: 27/07/2024

**Corresponding author: Dr. Seyed Abbas Mirmalak**  
Tel: 88787561

E-mail: [amirmalak@iautmu.ac.ir](mailto:amirmalak@iautmu.ac.ir)  
[mirmalak34@gmail.com](mailto:mirmalak34@gmail.com)

## Calculating the Odds Ratio

To calculate the odds ratio, the following steps should be undertaken:

- Calculate the odds of an individual within the population having characteristic A, given that they currently have characteristic B.
- Calculate the odds of an individual within the population having characteristic A, given that they currently do not have characteristic B.
- Divide the results from obtained in step 1 by those obtained in step 2 to derive the odds ratio.<sup>2</sup>
- Example: For illustrative purposes, let us consider characteristic A as being a smoker and characteristic B as having lung cancer.

The calculation proceeds as follows:

- Determine the odds of being a smoker among individuals diagnosed with lung cancer.
- Determine the odds of being a smoker among individuals who do not have lung cancer.
- The odds ratio is subsequently calculated by dividing the odds obtained in steps 1 and 2.

For instance, let us assume a sample comprising 100 patients with lung cancer and 100 healthy individuals. The objective is to assess whether smoking constitutes a risk factor for lung cancer. Within the cohort of 100 cancer patients, 20 are identified as smokers and 80 as non-smokers; among the 100 healthy individuals, 5 are smokers and 95 are non-smokers.<sup>9</sup>

In this scenario, if the calculated odds ratio equals one, it signifies no observed association between smoking and lung cancer.<sup>8</sup>

A value exceeding one indicates an increased likelihood of lung cancer associated with smoking, relative to non-smokers. Conversely, an odds ratio below one suggests a potential protective effect associated with non-exposure to smoking.<sup>8</sup>

It is crucial to acknowledge that the odds ratio is distinct from other epidemiological measures, such as relative risk and attributable risk, which will be further elucidated in the subsequent issue of this publication.

**References:**

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