

Probability Analysis of IBD, Anxiety, and Alzheimer's Co-occurrence

Abstract

$$P(\text{Anxiety} \mid \text{IBD}) = 0.691$$

$$P(\text{IBD} \mid \text{Anxiety}) = 0.567$$

$$P(\text{Alzheimer} \mid \text{IBD}) = 0.323$$

$$P(\text{Alzheimer} \mid \text{Anxiety}) = 0.312$$

$$P(\text{IBD} \cap \text{Anxiety} \cap \text{Alzheimer}) = 0.128$$

Data Summary

Total number of posts, $N = 2189$

Event	Count	Probability
IBD mentions, N_{IBD}	1254	$P(\text{IBD}) = \frac{1254}{2189} = 0.573$
Anxiety mentions, N_{Anxiety}	1529	$P(\text{Anxiety}) = \frac{1529}{2189} = 0.698$
Alzheimer mentions, $N_{\text{Alzheimer}}$	830	$P(\text{Alzheimer}) = \frac{830}{2189} = 0.379$
IBD & Anxiety	866	$P(\text{IBD} \cap \text{Anxiety}) = \frac{866}{2189} = 0.396$
IBD & Alzheimer	404	$P(\text{IBD} \cap \text{Alzheimer}) = \frac{404}{2189} = 0.185$
Anxiety & Alzheimer	478	$P(\text{Anxiety} \cap \text{Alzheimer}) = \frac{478}{2189} = 0.218$
IBD & Anxiety & Alzheimer	281	$P(\text{IBD} \cap \text{Anxiety} \cap \text{Alzheimer}) = \frac{281}{2189} = 0.128$

Joint and Conditional Probabilities

$$P(\text{IBD}) = 0.573$$

$$P(\text{Anxiety}) = 0.698$$

$$P(\text{Alzheimer}) = 0.379$$

$$P(\text{IBD} \cap \text{Anxiety}) = 0.396$$

$$P(\text{IBD} \cap \text{Alzheimer}) = 0.185$$

$$P(\text{Anxiety} \cap \text{Alzheimer}) = 0.218$$

$$P(\text{IBD} \cap \text{Anxiety} \cap \text{Alzheimer}) = 0.128$$

$$\begin{aligned}
P(\text{Anxiety} \mid \text{IBD}) &= \frac{P(\text{IBD} \cap \text{Anxiety})}{P(\text{IBD})} = \frac{0.396}{0.573} = 0.691 \\
P(\text{IBD} \mid \text{Anxiety}) &= \frac{P(\text{IBD} \cap \text{Anxiety})}{P(\text{Anxiety})} = \frac{0.396}{0.698} = 0.567 \\
P(\text{Alzheimer} \mid \text{IBD}) &= \frac{P(\text{IBD} \cap \text{Alzheimer})}{P(\text{IBD})} = \frac{0.185}{0.573} = 0.323 \\
P(\text{Alzheimer} \mid \text{Anxiety}) &= \frac{P(\text{Anxiety} \cap \text{Alzheimer})}{P(\text{Anxiety})} = \frac{0.218}{0.698} = 0.312
\end{aligned}$$

Remarks

The above probabilities are computed from a dataset filtered by keyword-based searches in Reddit posts. This introduces a sampling bias, meaning these probabilities reflect co-occurrence patterns within this biased sample and may not represent true prevalence or clinical comorbidity rates.