

The Relationship Of Alcohol Consumption, Smoking, And Body Mass Index On The Occurrence Of Triple Negative Breast Cancer: Meta-Analysis

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ABSTRACT

Triple Negative Breast Cancer (TNBC) is a type of cancer that is negative for the estrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor 2. Symptoms include swelling of all or part of the breast, skin dimpling, breast or nipple pain, retraction, nipples, red, dry, peeling or thickened nipple or breast skin, nipple discharge, swollen lymph nodes under the arms or near the collarbone. This research is a systematic review study with Meta Analysis using PRISMA guidelines. Alcohol drinkers are at greater risk of TNBC than non-alcohol drinkers (RR=3.17; 95% CI: 2.09-2.55; p = 0.0006), non-smokers are at greater risk of TNBC (RR=0.22; 95% CI: 0.14- 0.33; p = 0.00001), the relationship between people with BMI>25 and BMI<25 who had TNBC was not statistically significant (RR=1.02; 95% CI: 0.85-1.23; p = 0.83). Alcohol consumption has an effect on the occurrence of TNBC, non-smokers have an effect on the occurrence of TNBC, there were no significant results between BMI>25 and BMI<25 on the occurrence of TNBC.

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1. INTRODUCTION

Triple Negative Breast Cancer (TNBC) is a type of cancer that is negative for the estrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor 2. This subtype is characterized by rapid proliferation and progression rates, an aggressive clinical course, and Early metastases leading to poor prognosis complicate surgical treatment[5].

Data in Indonesia itself for TNBC is based on the Indonesian Journal of Cancer from January 2017 to December 2019, there were 79 patients who had complete clinicopathological and immunohistochemical data from 105 patients diagnosed with TNBC[8]. BMI with a higher WHR has a significantly increased risk of developing basal type TNBC compared to the lower WHR group[6]. In alcohol consumption, 10 g of alcohol per day triggers a 10.5% increase in the risk of breast cancer[13]. In addition, smoking is also associated with an increased risk of breast cancer, although the epidemiological evidence is mixed. Compared with someone who has never smoked, current smokers have a 24% increased risk of breast cancer and former smokers have a 13% increased risk[2]. Several studies show mixed results.

The triggers for TNBC are influenced by the behavior of consuming alcohol, smoking, and an overweight body mass index[1]. However, one study of postmenopausal women explained that there was no trend between alcohol consumption and smoking and the risk of TNBC[9]. Likewise, overweight BMI is not related to the risk of TNBC[4].

2. METHOD

This research is a Systematic Review research with Meta Analysis using PRISMA guidelines. The research was conducted by searching for studies on PubMed, Google Scholar, Science Direct, Cochrane, and handsearching in November 2023. The study sample used journals that had been sorted through exclusion and inclusion criteria in the article search. Meta-analysis was performed using Review Manager Software (RevMan V.5.3, Cochrane Collaboration, Oxford, UK). Summary statistics Combined Odds Ratio (OR) was calculated using dichotomous variables. Mean Difference (MD) was calculated using continuous variables. Both OR and MD are reported with 95% Confidence Intervals (CI). The Cochrane Chi-Squared Test and inconsistency (I²) were used to assess heterogeneity between studies. $p < 0.05$ was considered to indicate heterogeneity, while $I^2 < 50\%$ was considered to indicate acceptable heterogeneity.

3. RESULTS AND DISCUSSION

3.1. TNBC with a history of drinking alcohol or non-drinking alcohol

Table 1. Association between Alcoholics and Non-Alcoholics with TNBC

Study or Subgroup	Alcohol consumption		Non alcohol consumption		Weight	Risk Ratio	
	Events	Total	Events	Total		M-H, Random, 95% CI	M-H, Random, 95% CI
Kabat 2011	197	300	44	300	48.0%	4.48 [3.37, 5.95]	
Williams 2017	742	1064	322	1064	52.0%	2.30 [2.09, 2.55]	
Total (95% CI)		1364		1364	100.0%	3.17 [1.64, 6.13]	
Total events	939		366				
Heterogeneity: Tau ² = 0.22; Chi ² = 19.15, df = 1 (P < 0.0001); I ² = 95%							
Test for overall effect: Z = 3.43 (P = 0.0006)							

Table 1. Research by (Kabat et al., 2011b) and (Williams et al., 2017) shows significant confidence intervals. The combined effect shows a confidence interval of 2.09-2.55 (significant) and a P value = 0.0006 ($P < 0.005$ = significant) so that the research shows statistically significant that alcohol drinkers are more at risk of developing TNBC than non-alcohol drinkers. The results of the analysis show that the study variations have large heterogeneity ($I^2=95\%$) with an RR value=3.17.

3.2. TNBC with a history of smoking or non-smoking

Table 2. Relationship between Smokers and Non-Smokers affected by TNBC

Study or Subgroup	Smoking		Non smoking		Weight	Risk Ratio	
	Events	Total	Events	Total		M-H, Random, 95% CI	M-H, Random, 95% CI
Gaudet 2018	357	2676	1406	2676	46.4%	0.25 [0.23, 0.28]	
Kabat 2011	22	300	155	300	31.9%	0.14 [0.09, 0.22]	
Tariq 2014	8	39	28	39	21.7%	0.29 [0.15, 0.55]	
Total (95% CI)		3015		3015	100.0%	0.22 [0.14, 0.33]	
Total events	387		1589				
Heterogeneity: Tau ² = 0.09; Chi ² = 7.31, df = 2 (P = 0.03); I ² = 73%							
Test for overall effect: Z = 7.35 (P < 0.00001)							

Table 2. Research by (Gaudet et al., 2018), (Kabat et al., 2011a), and (Tariq et al., 2014) shows significant confidence intervals. The combined effect shows a confidence interval value of 0.14-0.33 (significant) and a P value < 0.00001 ($P < 0.05$ = significant) so that the research is statistically significant in interpreting that non-smokers are at greater risk of developing TNBC. The results of the analysis show that the study variations have large heterogeneity ($I^2=73\%$) with an RR value=0.22.

3.3. TNBC with BMI>25 or BMI<25

Table 2. Relationship between people with BMI>25 and BMI<25 who suffer from TNBC

Study or Subgroup	Smoking		Non smoking		Weight	Risk Ratio		M-H, Random, 95% CI
	Events	Total	Events	Total		M-H, Random, 95% CI	M-H, Random, 95% CI	
Gaudet 2018	357	2676	1406	2676	46.4%	0.25	[0.23, 0.28]	
Kabat 2011	22	300	155	300	31.9%	0.14	[0.09, 0.22]	
Tariq 2014	8	39	28	39	21.7%	0.29	[0.15, 0.55]	
Total (95% CI)		3015	3015	3015	100.0%	0.22	[0.14, 0.33]	
Total events	387		1589					
Heterogeneity: Tau ² = 0.09; Chi ² = 7.31, df = 2 (P = 0.03); I ² = 73%								
Test for overall effect: Z = 7.35 (P < 0.00001)								

Table 3. Research by (Gaudet et al., 2018) and (Saleh et al., 2021) shows a significant confidence interval, while research by (Maiti et al., 2010) shows a non-significant confidence interval. The combined effect shows a confidence interval of 0.85-1.23 (not significant) and a P value = 0.83 (P>0.05 = not significant) so that the research is not statistically significant. The results of the analysis show that the study variations have large heterogeneity (I²=92%) with an RR value=1.02.

4. CONCLUSION

Alcohol consumption has an effect on the occurrence of TNBC, non-smokers have an effect on the occurrence of TNBC, there were no significant results between BMI>25 and BMI<25 on the occurrence of TNBC.

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