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Meta-Analysis

Meta-Analysis: Obesity, Smoking, and Alcohol Consumption as risk Factors of Breast Cancer

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ABSTRACT

Background: Breast cancer is a type of cancer that is the main cause of death in women. Breast cancer is classified as a non-communicable disease that requires a long time for the development of cancer cells in the patient's body with various risk factors that are multifactorial. Several incidences of breast cancer are often associated with risk factors for an unhealthy lifestyle, including frequent consumption of fast food, less consumption of fruits and vegetables, lack of exercise, alcohol consumption, etc. This study aims to analyze the effect of obesity, smoking, and alcohol consumption on the risk of breast cancer in women.
Subjects and Method: This study used a systematic review of meta-analysis. Data search was carried out using electronic databases consisting of: PubMed, Science Direct, Europe PMC and Google Scholar with the search keywords used were "obesity" OR "BMI" AND "smoking" OR "smoking habit" AND " alcohol" OR "alcohol consumption" OR "alcohol intake" AND "breast cancer". Inclusion criteria were full text articles in English with case control studies collected using PRISMA guidelines, and analyzed using the Review Manager application (RevMan 5.3).
Results: A meta-analysis of 9 case-control study articles originating from Europe, North America, South America, Africa, and Asia showed women with obesity had a 3.53-fold increased risk of breast cancer compared with women of normal weight (aOR= 3.53; 95%CI= 2.70 to 4.62; p<0.001). A meta-analysis of 6 case-control study articles from Europe, North America, and, Asia showed that women who smoke have a 2.62 times higher risk of breast cancer compared to women who did not smoke (aOR= 2.62; 95%CI= 1.98 to 3.46; p<0.001). A meta-analysis of 7 case-control study articles originating from the continents of Africa, North America, South America, and, Europe showed that women who consume alcohol have a 3.62 times higher risk to have breast cancer compared to women who did not consume alcohol (aOR= 3.62; 95%CI= 2.31 to 5.69; p<0.001).
Conclusion: Obesity, smoking and alcohol consumption are risk factors for breast cancer.

Keywords: obesity, smoking, alcohol consumption, breast cancer

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BACKGROUND

According to data from the Global Burden of Cancer (Globocan), the number of cancer cases until 2018 was 18.1 million cases with 9.6 million deaths worldwide. This death case is expected to continue to increase to more than 13.1 million in 2030. Globocan in 2018 stated that breast cancer was the

second highest incidence after lung cancer at 11.6% or 2,089 million cases with the number of deaths at 6.6% or 627,000 deaths worldwide. It will increase in 2020 with estimates of new cases worldwide in all genders and the age range of 30-74 years, where breast cancer is in the second rank with 18.2% cases or 6,544,871 cases (Ministry of Health RI, 2020).

WHO (2020) noted that breast cancer is the most common cancer and the most significant cause of death in women. Based on the results of the Basic Health Research (Riskesdas) in 2018, the prevalence of cancer in women is greater than men, this is because specific types of cancer such as breast cancer are the main types of cancer that are most widely reported in Indonesia, in addition, this type of cancer also has a better early detection coverage than other types of cancer. Data sourced from the Indonesian cancer referral hospital which is Dharmais Cancer Hospital in 2018, showed that the proportion of cancer cases in all residents (men and women) in Indonesia was mostly dominated by breast cancer at 19.18% (Research and Development Agency, 2019). The estimated death rate from breast cancer in Indonesia in 2020 based on age standards is 15.3 per 100,000 deaths (Ministry of Health RI, 2020) (IARC, 2020).

The risk factors for breast cancer are different in each country in the world, both low-middle- and high-income countries. However, risk factors such as obesity and smoking are more dominant in high-income countries, while in low-to-middle-income countries risk factors such as smoking and alcohol consumption are the biggest risk factors for cancer death (Ministry of Health RI, 2015). A woman who has gone through menopause will produce the estrogen hormone which is slightly more than the fat tissue in her body. This causes obese women to have a higher risk of breast cancer compared to women who have proportional body mass (Krisdianto, 2019). Several studies show that BMI has a 2.7 times stronger effect on the increased risk of all sub-types of breast cancer among premenopausal and postmenopausal women (McCarthy et al., 2021).

Smoking behavior is also known to be one of the significant impacts, which found that women with smoking habits have a higher risk of breast cancer compared to women who do not smoke (Krisdianto, 2019). This is supported by the results of research which states that female smokers have a significant relationship with the risk of breast cancer. The increased risk of breast cancer was higher in women who had a smoking habit for 31 years with HR= 1.12 and p-value <0.001. This study also observed an increased risk of breast cancer in passive smokers, number of cigarettes per day, and smoking status before the birth of the first child, but it is known that women who are passive smoker are excluded from the reference group, the relationship between active smoking and breast cancer risk is observed to become stronger (Gram et al., 2019).

Other breast cancer risk factors related to hormones and genetics, which are related to diet which also have a negative impact are alcoholic beverages. Alcohol use can increase the risk of breast cancer, several studies show that the risk of breast cancer increases with an increase in alcohol intake (Kurniasari et al. 2017). The results of research done by Gilchrist et al. (2020) stated that there was a positive relationship between alcohol consumption and breast cancer in women. Some women with regular alcohol consumption habits of 2 times per day can increase the risk of breast can-

cer by 1.22 times compared to those who do not consume alcohol (White et al., 2017).

Based on this background, a comprehensive review of various primary studies on breast cancer risk factors is needed. This study was aimed to examine the effect of obesity, smoking, and alcohol consumption on the risk of breast cancer, based on the results of previous similar studies.

SUBJECTS AND METHOD

1. Study Design

This was a meta-analysis study design. This review was analyzed systematically using the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines. The article search process was carried out systematically and comprehendsively using electronic databases including PubMed, Science Direct, Europe PMC and Google Scholar with the search keywords used were “obesity” OR “BMI” OR “obese overweight” AND “smoking” OR “smoking habit” AND “alcohol” OR “alcohol consumption” OR “alcohol intake” OR “drink alcohol” AND “breast cancer” OR “ca mammae”. Based on a database search, 17 articles were selected that met the criteria, namely full-text articles with a case-control study design.

2. Inclusion Criteria

The researchers developed inclusion criteria to facilitate the selection and analysis process of articles with a case-control study design, namely full-text articles, articles that clearly state the appropriate title, namely obesity, smoking and alcohol consumption are associated with breast cancer risk in women. Articles using a case-control study design. Articles published in English. Articles have enough data to analyze. The analysis used in this article was multivariate by ensuring the adjusted odds ratio (aOR).

3. Exclusion Criteria

The exclusion criteria for the articles used in this study were mixed studies such as cardiovascular, ovarian cancer, and thyroid cancer. Articles with breast cancer outcomes mentioning surviving breast cancer patients, and anonymous studies.

4. Operational Definition of Variables

In formulating the study problem, the rsearchers used the PICO model. The population in this study were women. Interventions were obesity, smoking, and alcohol consumption with comparisons of normal weight, not smoking, and not consuming alcohol. The result was breast cancer.

Obesity is a condition characterized by a disturbance in the body's energy balance in which there is an imbalance between energy intake and energy expenditure, which is stored in the form of fat in body tissues for a long period of time.

Smoking is the activity of smoking tobacco mixed with tar and nicotine in paper or pipes that can cause smoke.

Alcohol is a liquid substance of the type of drug that is packaged in the form of a drink, acting as a reliever drug in the activity of the central nervous system which causes addiction and dependence.

Breast Cancer is a condition that begins with loss of control and mechanism of cells in the breast that grow and develop in breast tissue resulting in abnormal growth, which generally affects women.

5. Study Instrument

A systematic review was carried out by following the PRISMA 2009 flow diagram guidelines, and evaluating the quality of articles using the Critical Appraisal Skills Program (CSAP, 2018).

6. Data Analysis

Articles that have been collected are selected according to predetermined criteria. This is a meta-analysis study that uses secondary data in the form of data

from previous study where data processing used the Review Manager (RevMan 5.3) to determine how much influence the analysis has on the risk of breast cancer. Variation of study data was divided into two, namely Fixed Effect Model (FEM) and Random Effect Model (REM). The results of data processing were presented in the forest plot and funnel plot graphs to describe the combined effect size of each studied variable.

RESULTS

The article selection process was carried out using the PRISMA flow chart which can be seen in Figure 1. The total articles obtained were 17 articles from the initial search process resulting 1429 articles, after going through the article deletion process, 251 articles were obtained, then a selection of eligible articles was carried out so that 17 articles were obtained included in the meta-analysis study.

Figure 2 shows the distribution of articles on 5 continents, namely North America, South America, Asia, Africa and Europe. Table. 1 shows 17 articles from case-control studies that provide quantitative evidence of primary study quality research using the Critical Appraisal Skills Program critical assessment checklist (CASP, 2018).

Based on the answers to the article quality assessment, the value of the article quality was 22 to 24. This showed that the articles obtained have good quality to be used as meta-analysis study (CASP, 2018).

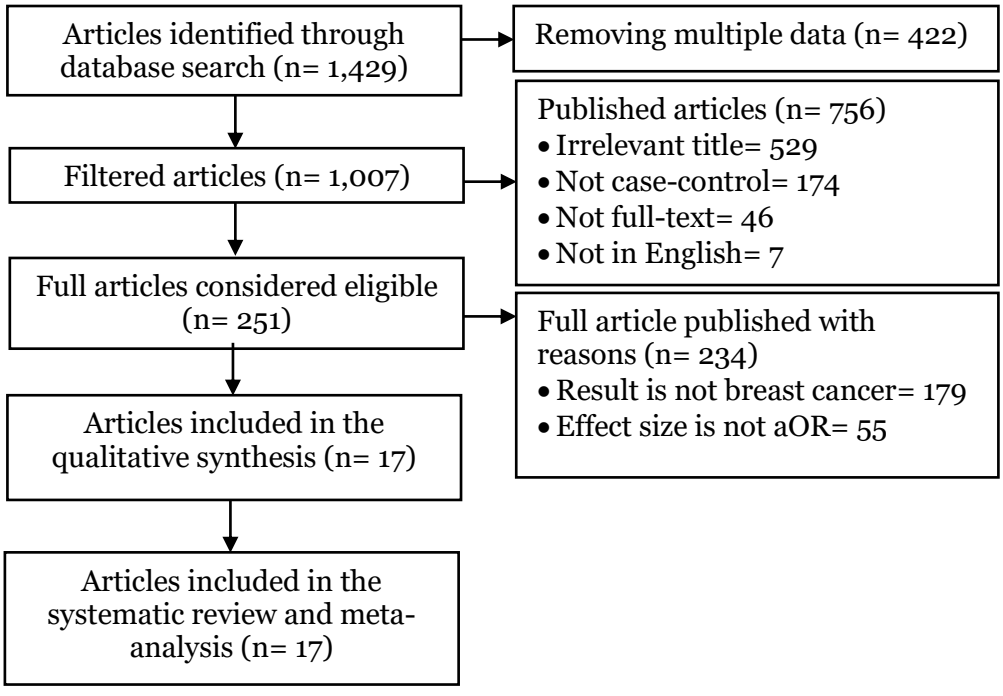

Figure 1. PRISMA Flow Diagram

Table 1. Assessment of article quality with case-control study design

No	Indicators	Publication (Author and Year)								
		Gravena et al. (2018)	Akinyem et al. (2021)	Park et al. (2016)	Tolessa et al. (2021)	Qian et al. (2014)	Wu et al. (2012)	Ilic et al. (2013)	Vieira et al. (2018)	Guerrero et al. (2017)
1	Does this study discuss clearly focused problem?	2	2	2	2	2	2	2	2	2
2	Does the author use the method the right one to answer the question study?	2	2	2	2	2	2	2	2	2
3	Are cases recruited in a way that acceptable?	2	2	2	2	2	2	2	2	2
4	Is the control selected with acceptable way?	2	2	2	2	2	2	2	2	2
5	Is exposure measured accurately to minimize bias?	2	2	1	2	2	1	2	2	2
6	Apart from the intervention, does the group treated the same way?	2	2	2	1	2	2	2	2	2
7	Does the author take into account the factors confounders in design and/or in analysis?	1	2	2	2	2	2	2	1	2
8	How big is the effect of the treatment?	2	2	2	2	2	2	2	2	2
9	How precise is the estimated effect treatment?	2	2	2	2	2	2	2	2	2
10	Do you believe the results?	2	2	2	2	2	2	2	2	2
11	Can the results be applied to local residents?	2	1	2	1	1	2	1	2	2
12	Are the results of this study in accordance with available evidence?	2	1	2	2	2	2	2	1	2
	Total	**23**	**22**	**23**	**22**	**23**	**23**	**23**	**22**	**24**

Note:

2: Yes; 1: Can't Tell; 0: No

Table 2.Cont.

No	Questions	Publication (Author and Year)							
		Gao et al. (2013)	Louati et al. (2021)	Payandeh et al. (2021)	Dominguez et al. (2016)	Ko et al. (2015)	Schairer et al. (2020)	Shamsi et al. (2021)	Lee et al. (2020)
1	Does this study discuss clearly focused problem?	2	2	2	2	2	2	2	2
2	Does the author use the method the right one to answer the question study?	2	2	2	2	2	2	2	2
3	Are cases recruited in a way that acceptable?	2	2	2	2	2	2	2	2
4	Is the control selected with acceptable way?	2	2	2	2	2	2	2	2
5	Is exposure measured accurately to minimize bias?	1	2	2	1	2	2	2	2
6	Apart from the intervention, does the group treated the same way?	2	2	2	2	2	2	2	2
7	Does the author take into account the factors confounders in design and/or in analysis?	2	2	1	2	2	1	2	2
8	How big is the effect of the treatment?	2	2	2	2	2	2	2	2
9	How precise is the estimated effect treatment?	2	2	2	2	2	2	2	2
10	Do you believe the results?	2	2	2	2	2	2	2	2
11	Can the results be applied to local residents?	1	2	1	2	1	1	2	2
12	Are the results of this study in accordance with available evidence?	2	1	2	2	2	2	2	2
	Total	**22**	**23**	**22**	**23**	**23**	**22**	**24**	**24**

Note:

2: Yes; 1: Can't Tell; 0: No

Table 3. Description of the study of the effect of obesity on breast cancer risk

Author	Country	Sample	Study Design	Population	Intervention	Comparison	Outcome	aOR (95%CI)
Gravena et al. (2018)	Brazil	100 cases 400 control	Control case	Women aged 45-70 years old	BMI ≥30 kg/m²	BMI <30 kg/m²	Breast cancer	1.56 (1.11 to 2.21)
Akinyemiju et al. (2021)	Nigeria	419 cases 286 control	Control case	Women aged 40-60 years old	BMI ≥30 kg/m²	BMI ≤ 22.5 kg/m²	Breast cancer	0.59 (0.35 to 0.99)
Tolessa et al. (2021)	Ethiopia	116 cases 232 control	Control case	Women aged 42-74 years old	Obesity	Normal weight	Breast cancer	2.38 (1.00 to 4.31)
Guerrero et al. (2017)	Mariana Island	104 cases 185 control	Control case	Women aged 40-70 years old	BMI ≥35 kg/m²	BMI 18-24.9 kg/m²	Breast cancer	2.08 (0.74 to 5.88)
Louati et al. (2021)	France	1232 cases 1317 control	Control case	Women aged 25-75 years old	BMI ≥30 kg/m² among postmenopausal women	BMI 18.5-25 kg/m² among postmenopausal women	Breast cancer	1.06 (0.74 to 1.52)
Payandeh et al. (2021)	Iran	150 cases 150 control	Control case	Women aged 40-60 years old	BMI >25 kg/m²	BMI <25 kg/m²	Breast cancer	1.63 (0.77 to 3.46)
Schairer et al. (2020)	California	247 cases 247 control	Control case	Women aged 40-95 years old	BMI ≥35 kg/m²	BMI <25 kg/m²	Breast cancer	2.9 (1.70 to 4.9)
Shamsi et al. (2021)	Pakistan	178 cases 299 control	Control case	Women aged 35-74 years old	BMI ≥30 kg/m²	Normal weight	Breast cancer	0.94 (0.90 to 0.99)
Lee et al. (2020)	Hongkong	1156 cases 1013 control	Control case	Women aged 30-84 years old	Overweight and obese BMI (≥25.0-29.9 kg/m²)	Normal and underweight BMI (<25.0 kg/m²)	Breast cancer	1.26 (1.02 to 1.56)

Table 4. Description of the study of the effect of smoking on breast cancer risk

Author	Country	Sample	Study Design	Population	Intervention	Comparison	Outcome	aOR (95% CI)
Park et al. (2016)	African-American	5791 cases 17376 control	Control case	Women aged 40-75 years	Ex-smoker	Never smoking	Breast cancer	1.17 (0.90 to 1.51)
Ilic et al. (2013)	Serbia	191 cases 191 control	Control case	Women aged 40-70 years	Smoking	Never smoke without passive exposure	Breast cancer	0.72 (0.40 to 1.27)
Guerrero et al. (2017)	Mariana Island	104 cases 185 control	Control case	Women aged 40-70 years	Smoking daily for >6 months	Not smoking for >6 months	Breast cancer	0.71 (0.36 to 1.41)
Gao et al. (2013)	China	669 cases 682 control	Control case	Women aged 40-60 years	Smoking	Never smoking	Breast cancer	1.47 (1.18 to 1.84)
Louati et al. (2021)	France	1232 cases 1317 control	Control case	Women aged 25-75 years old	Smoking	Never smoking	Breast cancer	1.10 (0.83 to 1.47)
Ko et al. (2015)	Korea	547 cases 783 control	Control case	Women aged 30-65 years	Ex-smoker	Not a smoker	Breast cancer	0.60 (0.37 to 0.98)

Table 5. Description of the study of the effect of alcohol consumption on breast cancer risk

Author	Country	Sample	Study Design	Population	Intervention	Comparison	Outcome	aOR (95% CI)
Qian et al. (2014)	Nigeria, Cameroon, Uganda	2138 cases 2589 control	Control case	Women aged 35-60 years old	Ever consumed alcohol	Never consumed alcohol	Breast cancer	1.62 (1.33 to 1.97)
Wu et al. (2012)	Los Angeles	2229 cases 2002 control	Control case	Women aged 35-74 years old	Alcohol consumption >5 g/day	Alcohol consumption 0-5g/day	Breast cancer	1.64 (1.18 to 2.26)
Vieira et al. (2018)	Brazil	406 cases 1100 control	Control case	Women aged 45-70 years old	Alcohol consumption for 50 years	Never consumed alcohol	Breast cancer	0.8 (0.2 to 3.3)
Guerrero et al. (2017)	Mariana Island	104 cases 185 control	Control case	Women aged 40-70 years old	Alcohol consumption in the past year	Have not consumed alcohol in the past year	Breast cancer	0.49 (0.21 to 1.13)
Gao et al. (2013)	China	669 cases 682 control	Control case	Women aged 40-60 years old	Ever consumed alcohol	Never consumed alcohol	Breast cancer	1.86 (1.02 to 3.39)
Dominguez et al. (2016)	Spain	1766 cases 833 control	Control case	Women aged 40-70 years old	Alcohol intake: heavy drinkers (>7 per week)	Abstainers (Do not consume alcohol)	Breast cancer	1.77 (1.08 to 2.92)
Louati et al. (2021)	France	1232 cases 1317 control	Control case	Women aged 25-75 years old	Consumption of alcohol ≥14 glasses per week	Consumption of alcohol 0-3 glasses per week	Breast cancer	1.07 (0.64 to 1.79)

Figure 2. Map of study area

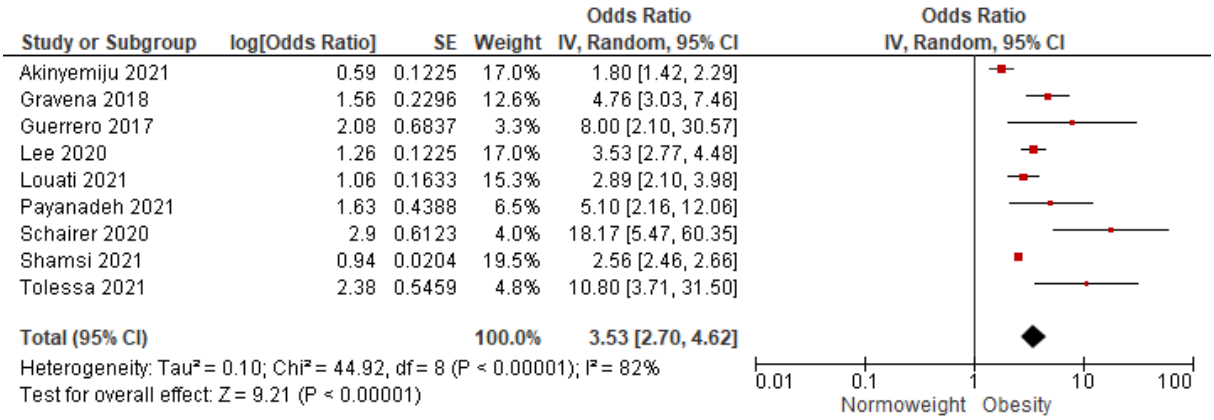

Figure 3. Forest plot of the effect of obesity on breast cancer

The interpretation of the results of the meta-analysis of 9 articles showed a heterogeneity value of I^2 = 82%, so that the distribution of the data was heterogeneous and used a random effects model analysis. From the results of the forest plot, which can be seen in the picture 3 showed that the risk of breast cancer increased by 3.53 times (aOR= 3.53; 95%CI= 2.70 to 4.62; p<0.001) in obese women compared with normal weight women.

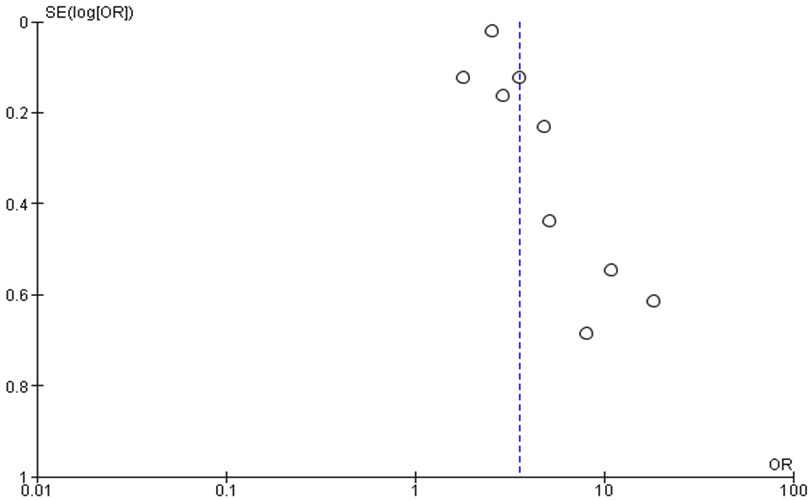

Figure 4. Funnel plot of the effect of obesity on breast cancer

In figure 4, it can be seen that the funnel plot of obesity and breast cancer showed that there was a potential for publication bias which was characterized by an asymmetric distribution of the primary study estimates between plots which were more to the right of the vertical line than to the left, and there was 1 plot that was tangent to the vertical line.

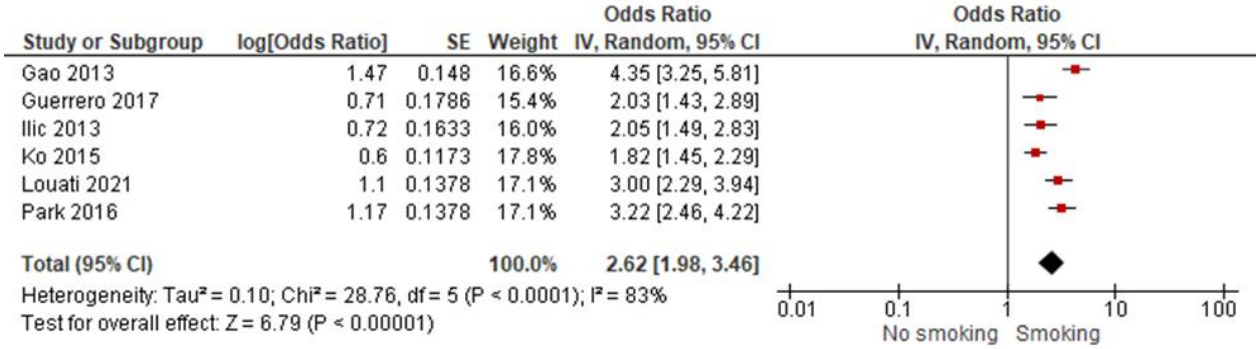

Figure 5. Forest plot of the effect of smoking on breast cancer

The interpretation of the results of the meta-analysis of 6 articles showed a heterogeneity value of I^2 = 83%, so that the distribution of the data was heterogeneous and used a random effects model analysis. From the results of the forest plot, which can be seen in the picture 5 showed that the risk of breast cancer increased by 2.62 times (aOR= 2.62; 95% CI= 1.98 to 3.46; p <0.001) in women who smoked compared to women who did not smoke.

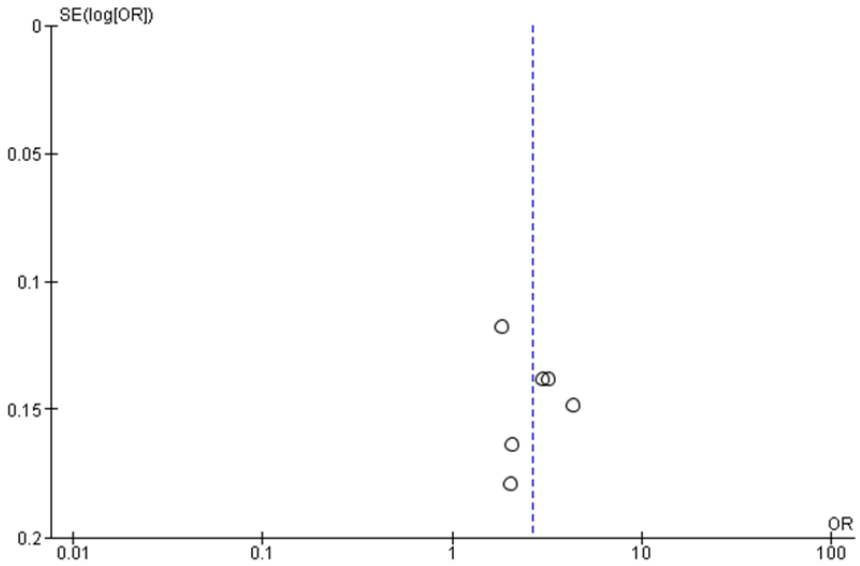

Figure 6. Funnel plot of the effect of smoking on breast cancer

Figure 6 showed the results of the funnel plot of smoking with breast cancer which showed that there was a potential for publication bias which was indicated by the asymmetric distribution of the primary study estimates between plots that were more to the left of the vertical line than to the right.

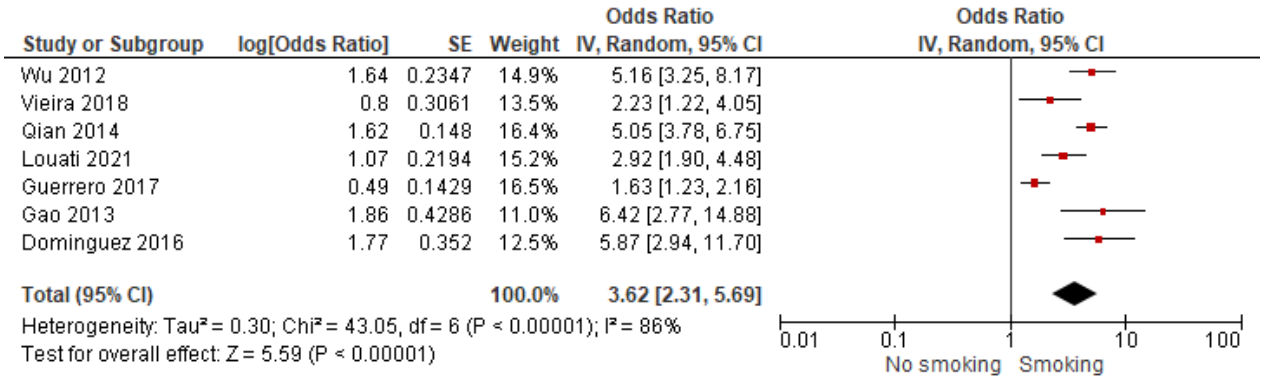

Figure 7. Forest plot of the effect of alcohol consumption on breast cancer

The interpretation of the results of the meta-analysis of 7 articles showed a heterogeneity value of I^2 = 86%, so that the distribution of the data was heterogeneous and used a random effects model analysis. From the results of the forest plot, which can be seen in the picture 7 showed that the risk of breast cancer increased by 3.62 times (aOR= 3.62; 95% CI= 2.31 to 5.69; p <0.001) in women who consumed alcohol compared to women who did not consume alcohol.

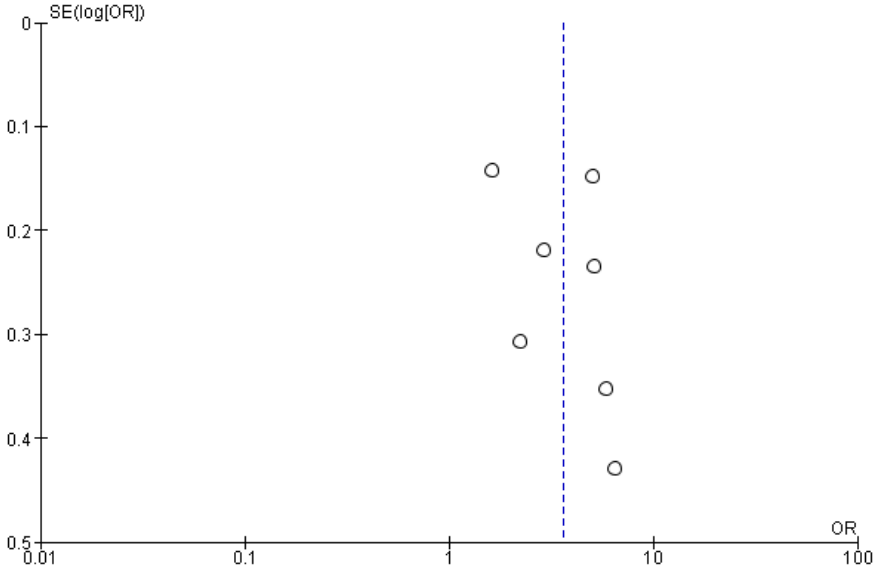

Figure 8. Funnel plot of the effect of alcohol consumption on breast cancer

Figure 8 showed that there was a potential for publication bias which was characterized by an asymmetric distribution of the primary study estimates between plots that were more to the right of the vertical line than to the left.

DISCUSSION

This systematic review and meta-analysis of study discussed the influence of obesity, smoking and alcohol consumption on breast cancer risk. This study used primary research sources that control one confounding factor or several confounding factors which can be seen from the inclusion requirements of the study, namely multivariate analysis and the statistical results reported were adjusted odds ratio (aOR). If a woman has risk factors, it does not mean that she will definitely develop breast

cancer, but it will increase her chances of developing breast cancer.

1. Results of the effect of obesity on breast cancer risk

The results of the forest plot study of research articles with a case-control design showed that obese women had a 3.53 times higher risk of developing breast cancer (aOR= 3.53; 95%CI= 2.70 to 4.62; p <0.001) compared to women with normal weight.

In premenopausal and postmenopausal women, the increased risk of breast cancer is influenced by high BMI values. This is evidenced by the value of aRR= 1.68; 95%CI= 1.02 to 1.06). Meanwhile, postmenopausal women in BI-RADS category 1 with obesity had a 2.45 times higher risk of breast cancer (aRR = 2.45; 95% CI = 1.87 to 3.21) compared to underweight women (Tran et al., 2021).

This is in accordance with research conducted by Feigelson et al. (2021), which stated that an increase in BMI had a significant relationship with an increased risk of breast cancer by 7% (RR= 1.07; 95% CI= 1.01 to 1.14; p<0.01), 13% (RR= 1.13; 95% CI= 1.05 to 1.21; p<0.001) for obesity-related cancer, 11% (RR=1.11; 95% CI=1.02 to 1.21; p<0.01). The pattern of association between BMI values is presented in categories (normal, overweight, and obese) for similar results as a continuous variable.

Obesity is a major risk factor for breast cancer in postmenopausal women. There are many studies supporting this statement. A higher BMI increases the risk of breast cancer by 50% if the individual has weighed more than 55 kg since the age of 18 years old. The risk of postmenopausal breast cancer increases by 11% per every 11 kg of body weight in adults. In obese or overweight women, postmenopausal Estrogen receptor (ER+) is positive so that it can increase the risk of breast cancer about 1.5 to 2 times higher. Furthermore, it is said that the increased risk of breast cancer reaches 70% if weight gain occurs after menopause (Zuo et al., 2021).

This is in line with the research of Özgöz et al. (2021) who stated that obesity has been reported to be correlated in a complex way with breast cancer risk. It was found less in individuals with ADIPOQ geno type rs 1501299 TT (p= 0.019) and rs 2241766 GT (p= 0.017) in breast cancer patients with values (OR= 1.30; 95% CI= 0.72 to 2.35).

In addition, this statement is supported by Lam et al. (2021) that obese or overweight women at the time of breast cancer diagnosis can increase the risk of cancer recurrence and death compared to women who have normal weight and thin women. The Nurses' Health Study showed that women with Type 2 DM had a 1.17 times higher incidence of breast cancer (HR= 1.17; 95%CI= 1.01 to 1.35) compared to women without diabetes.

2. Results of the effect of smoking on breast cancer risk

The forest plot results showed that the risk of breast cancer was increased by 2.62 times in women who smoked (aOR= 2.62; 95%CI= 1.98 to 3.46; p<0.001) compared to women who did not smoke.

The content of carcinogens in cigarettes can cause breast cancer. Studies have shown that the chemicals in tobacco smoke reach breast tissue and are found in breast milk, and some studies suggest that it can increase the risk of breast cancer, especially in premenopausal women. The long duration of smoking will increase the adverse effects on health. Epidemiological investigations have found that a history of active smoking carries a significantly greater risk of developing breast cancer (American Cancer Society, 2020).

This is in accordance with Li et al. (2019) which stated that female smokers who smoked for more than 5 years were 1.25 times more likely to develop type 2 breast cancer (BRCA2) (aHR= 1.25; 95% CI= 1.01 to 1.55) and (aHR= 1.30; 95% CI= 0.83 to 2.01).

This is in line with the research of Pakzad et al. (2020) which stated that the results of conventional logistic regression analysis adjusted for smoking and breast cancer found substantial evidence after controlling for three confounding factors namely age, alcohol consumption, education level, where the risk of breast cancer increased by 0.64 times in women who smoked compared to non-smokers women (aOR= 0.64; 95% CI= 0.36 to 1.13).

Women who smoke are more likely to have a higher risk of developing breast cancer than women who have never smoked. In general, women who smoke are diagnosed with breast cancer at an advanced stage or higher because of failure in cancer screening efforts. Women who smoked had a 2.26 times higher risk of developing advanced breast cancer compared with women who had never smoked or were former smokers (aOR= 2.26; 95%CI= 1.01 to 5.05) at screening mammography after 2 years of initial examination. This is also triggered by the long duration of smoking in women who smoke above 10 years (Eng et al., 2020).

This is consistent with a study which stated that women who smoked had an 11% higher risk of breast cancer (95% CI = 1.02 to 1.22) compared to those who were not exposed. These results suggest that 1 in 14 cases of breast cancer could be avoided by not having parental exposure to secondhand smoke during childhood in a population of non-smoking women (Gram et al., 2021).

3. Results of the effect of alcohol consumption on breast cancer risk

The forest plot results showed that the risk of breast cancer was increased by 3.62 times in women who consumed alcohol (aOR= 3.62; 95% CI= 2.31 to 5.69; p <0.001) compared to women who did not consume alcohol.

In a meta-analysis study conducted by Rumgay et al. (2021), it is stated that the effect of alcohol consumption in women (10 g/day) would increase the risk of breast cancer by 7% (RR = 1.09; 95% CI = 1.07 to 1.12). Research conducted by WCRF showed that an increase in alcohol consumption at a dose of 10 g alcohol/ day had a significant relationship with an increase in breast cancer studied in several locations with three levels of alcohol intake, namely mild (12.5 g/ day), moderate (12.5-50). g/day), and weight (> 50g/day).

This is in line with research which stated that alcohol consumption provides a significant risk of breast cancer. Breast cancer risk was associated with a higher pattern of alcohol consumption when alcohol intake was concentrated at 8-14 times/week compared with total alcohol intake of 3-7 times/week (HR= 1.15; 95% CI= 1.00 to 1.34) (Sarich et al., 2021).

In addition, this is also supported by research done by Agabio et al. (2021), who said that alcohol consumption was identified as being associated with breast cancer among women attending a breast screening program by 10.9 times higher (OR = 10.9; 95% CI = 4.8 to 16.8). The study found that only 16.9% of a sample of Italian women attending a breast screening program which identified alcohol consumption as a risk factor.

Epidemiological data from a review of research strongly suggest an association between alcohol consumption and breast cancer risk. Alcohol intake has been asso-

ciated with an increased risk of breast cancer in women who have a habit of consuming alcohol, increasing the potential for carcinogenesis. Alcohol consumption within the recommended limits is socially acceptable and common in most countries around the world. It is also said that consuming alcohol should not be more than one alcoholic drink per day, preferably consuming red wine which is beneficial for health (Lam et al., 2021).

This is supported by research which stated that at moderate alcohol intake (>20 g/day), participants with a high polygenetic risk score (PRS) had an 8.07-fold higher risk of breast cancer compared to those with a lower polygenetic risk score (PRS). However, the prevalence of breast cancer was much higher in women with mild alcohol intake (0–20 g/day) than women with moderate alcohol intake regardless of PRS score (aOR= 0.390; 95%CI= 0.124 to 1.226) (Song et al., 2022).

The limitation of this study is the publication bias shown in the funnel plot on the three variables. There is a language bias, because in this study only articles in English were selected, thus ignoring articles in other languages.

AUTHOR CONTRIBUTION

Yuliana Yuvrista and Wiwit Marliana is the main researcher in this study who chose the topic, searched for and collected the data.

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CONFLICT OF INTEREST

There was no conflict of interest in this study.

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