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Masters Program in Public Health, Universitas Sebelas Maret

Meta-Analysis

Meta-Analysis of the Effects of Stress and Anxiety on Alcohol Consumption Behavior in Early Adults

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ABSTRACT

Background: Consumption of alcoholic beverages is a risk factor for health problems globally. The consumption of alcoholic beverages is very influential on the effect of calmness in people who have anxiety and stress disorders. The effect occurs because alcohol is classified as a psychoactive substance that affects nerves in the brain with the effect of dependence on the dose consumed. This study aims to assess the effect size of stress and anxiety on increased alcohol consumption behavior in early adulthood using a meta-analysis of primary studies conducted by the previous authors.
Subjects and Method: This study was a meta-analysis with the following PICO, population: Early adults (18-25 years). Intervention: Stress and Anxiety. Comparison: no stress and no anxiety. Result: Increased Alcoholic Beverages Consumption Behavior. 9 The articles used in this study were obtained from three databases namely Google Scholar, PubMed, and Scopus. The keywords for searching for articles were stress AND (Anxiety OR nervousness OR discomfort) AND ("consumption of drinking alcohol" OR "Alcohol use"). The included articles were full-text English with a cross-sectional study design from 2012 to 2022. Article selection was conducted using the PRISMA flow diagram. Articles were analyzed using the Review Manager 5.3 app.
Results: A total of 9 cross-sectional case studies from Europe, Asia, North America, Africa, and Australia were selected for systematic review and meta-analysis. 7 studies discovered that stress increased alcoholic beverage consumption behavior in early adults by 1.29 times compared to low stress, and the result of the meta-analysis was statistically significant (aOR= 1.29; CI 95%= 1.31-1.47; p< 0.001) with the heterogeneity of I^2= 84%, p<0.001. 7 studies of the effect of anxiety on increased alcoholic beverage consumption behavior in early adults showed anxiety increased alcoholic beverage consumption behavior in early adults by 1.59 times compared to low anxiety. The result of the meta-analysis was statistically significant (aOR= 1.59; CI 95%= 1.22-2.07; p= 0.001) with heterogeneity of I^2=96%, p< 0.001.
Conclusion: Stress and anxiety increased the behavior of alcoholic beverage consumption in early adults..

Keywords: stress, anxiety, alcohol consumption.

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BACKGROUND

The increased alcohol consumption behavior is a social problem phenomenon in developing countries as well as in developed countries. The implementation of policies related to alcohol consumption is very important in controlling or reducing the prevalence of alcohol consumption. The policies in tackling alcohol use are laws, rules, and regulations aimed at preventing and reducing the negative impact of alcohol consumption. Policies related to alcohol consumption are global, regional, and international/national level. One of the policy strategies issued is to increase alcohol excise taxes and limit alcohol availability (WHO, 2018).

The highest rate of alcohol consumption and alcohol use disorders is found in European countries with the lowest percentage in the East Mediterranean region which was 2.9% of the Population (WHO, 2018). Meanwhile, alcohol consumption per capita in Southeast Asia increases by 34 percent (34%) compared to Europe which decreases by 12 percent (12%) (WHO, 2018). In Indonesia, the population that consumed alcoholic beverages in 2018 is 3.3% of all provinces in Indonesia (Riskesdas, 2018).

Alcoholic beverages are one of the risk factors for health problems globally. The habit of drinking alcoholic beverages can cause health disorders. Excessive alcohol use causes more than 140,000 deaths in the United States each year, with an average age of 26 years (CDC, 2022), and out of 241,000,000 people in Indonesia, the prevalence of health disorders due to alcohol use is 0. 8%, and the prevalence of alcohol dependence is 0.7% in both men and women (Global status report alcohol and health, 2014).

National surveys such as the National Epidemiologic Survey on Alcohol and Related Conditions and the National Survey on Drug Use and Health, discovered that young adults aged 18-25 years have a high risk of alcohol use disorders and accidental injury from drinking (Delker et al., 2016). The proportion of alcohol consumption in Indonesia is found at the age of 20-29 years at 6. 4% (Riskesdas, 2018).

The consumption of alcoholic beverages is very influential on the effect of calmness in people who have anxiety and stress disorders. The effect occurs because alcohol is a psychoactive substance that affects nerves in the brain with the effect of dependence on the dose consumed (WHO, 2018)

Some claim that consuming alcoholic beverages can reduce the effect of stress on individuals. College students are one of those who often experience stress. College students in the age group of 18-29 years use alcohol as a form of coping to reduce the effect of stress. This creates several problems in terms of the uncontrolled level of alcohol consumption (Armelia, 2016).

SUBJECTS AND METHOD

1. Study Design

This study was a systematic study and meta-analysis. The articles used in this study were obtained from several databases, namely Google Scholar, PubMed, and Scopus published between 2012 and 2021. Article selection was conducted by using a PRISMA flowchart. The keywords for searching for articles were stress AND (Anxiety OR nervousness OR discomfort) AND ("consumption of drinking alcohol" OR "Alcohol use").

2. Step of Meta-Analysis

The meta-analysis was carried out in five steps as follows:

1) Formulate research questions in the PICO format (Population, Intervention, Comparison, Outcome).

2) Search for primary study articles from various electronic and non-electronic databases.
3) Conduct screening and critical assessment of primary research articles.
4) Perform data extraction and synthesize effect estimates into RevMan 5.3.
5) Interpret and conclude the results

3. Inclusion Criteria

The inclusion criteria of the study articles were full-text articles with a cross-sectional design, the subject of the study was early adults, the result of the study was increased alcoholic beverages consumption behavior, and the multivariate analysis was with aOR values.

4. Exclusion Criteria

The exclusion criteria of the study were articles published in non-English languages, statistical results reported in the form of bivariate analysis, published before 2012.

5. Operational Definition of Variables

Stress and Anxiety are the existence of a discrepancy between the desired situation and the biological, psychological, or social system of the individual that causes feelings that arise in the individual's personality due to threatening situations or conditions or fear/worry/anxiety.

Consumption of alcoholic beverages is individuals who consume alcoholic beverages.

6. Instruments

This systematic review was carried out following the PRISMA flow diagram guidelines, with an assessment of the quality of the articles using the Critical Appraisal Skills Program for Cross-Sectional (CEBMa, 2014).

7. Data Analysis

The articles that have been collected are selected according to predetermined criteria. Data processing uses RevMan 5.3 to determine the influence of male participation on the use of contraceptives. Variation of research data is divided into Fixed Effect Model and Random Effect Model. The results of data processing are presented in forest plot and funnel plot graphs.

RESULTS

Search articles in this study through databases that include PubMed, Google Scholar, and Scopus. The keywords used were Anxiety OR nervousness OR discomfort) AND ("consumption of drinking alcohol" OR "Alcohol use").

The article selection process used the PRISMA flow diagram which can be seen in Figure 1, where the total articles in the initial search process were 1,406 articles. Furthermore, as many as 858 articles were screened and 54 articles with full text were obtained whose feasibility was tested, so that the total articles obtained were 9 articles.

Figure 2 shows the distribution of articles on the African continent, namely 1 article from from 5 continents namely Europe (UK), Asia (Lebanon, India), Australia (Australia), Africa (Ethiopia), and North America (Washington).

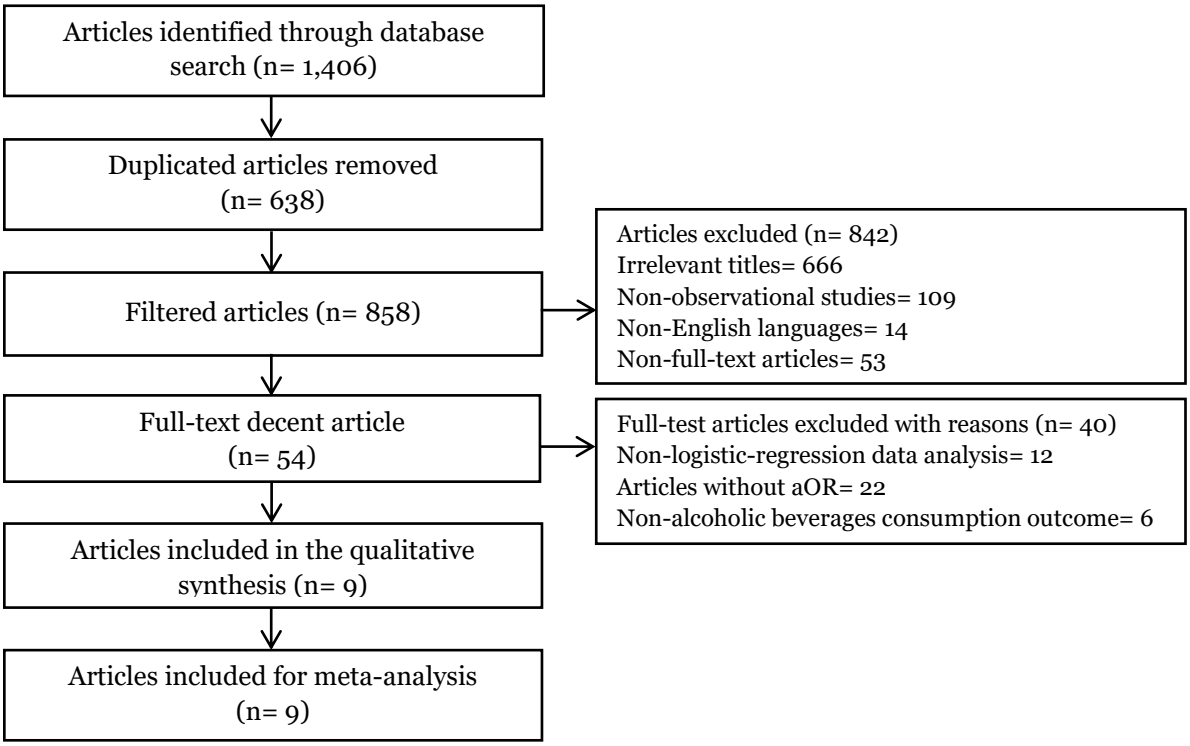

Figure 1. Results of Prisma Flow Diagrams

Figure 2. Resarch Distribution Map

Table 1. Critical Appraisal using CEBM

Primary Study	Criteria												
	1	2	3	4	5	6	7	8	9	10	11	12	Total
Asfaw et al. (2021)	2	2	2	2	2	2	2	2	2	2	2	2	24
Obeid et al. (2020)	2	2	2	2	2	2	2	2	2	2	2	2	24
Avery et al. (2020)	2	2	2	2	2	1	2	2	2	2	2	2	23
Stanton et al. (2020)	2	2	2	2	2	2	2	2	2	2	2	2	24
Verma et al. (2020)	2	2	2	2	2	1	2	2	2	2	2	2	23
Tesfahunegn & Gebremariam (2019)	2	2	2	2	2	2	2	2	2	2	2	2	24
Wolf et al. (2020)	2	2	2	2	2	2	2	2	2	2	2	2	24
Smith et al. (2020)	2	2	2	2	2	0	2	2	2	2	2	2	23
Jacob et al. (2020)	2	2	2	2	2	0	2	2	2	2	2	2	22

Description of the question criteria:

1. Do the research objectives clearly address the focus/problem of the research?
2. Is the research method (research design) suitable for answering the research question?
3. Is the research subject selection method clearly written?
4. Does the sampling method give rise to bias (selection)?
5. Does the research sample take represent the designated population?
6. Was the sample size based on pre-study considerations?
7. Is the measurement method achievable?
8. Are the research instruments valid and reliable?
9. Was statistical significance assessed?
10. Was a confidence interval given for the main outcome?
11. Are there any confounding factors that have not been taken into account?
12. Are the results applicable to your research?

Description of scoring:

Yes = 2;
Hesitate=1;
No =0

In Table 1, the researcher made an assessment of study quality. The nine articles obtained from various databases were evaluated to determine their quality before being used as materials in the meta-analysis process. This research was conducted by using a checklist for assessment critical of the cross-sectional study (survey). sourced from the Center for Evidence-Based Management (CEBMa) (2014).

This assessment criteria consists of 12 criteria questions with a score assigned to each. If the answer is yes, write 2, if the answer is no, write 1, and if there is no answer, write 0. The sum of the scores obtained resulted in 5 articles receiving a total answer score of 24 there is Asfawa et al. (2021), Obeid et al. (2020), Stanton et al. (2020), Tesfahunegn & Gebremariam (2019), Wolf et al. (2020). In addition, there are 3 articles with a total answer score of 23, there is Avery et al. (2020), Verma et al. (2020), Smith et al. (2020), and there is 1 article with total answer score 22, there is Jacob et al. (2020).

Table 2. Description of primary studies included in the meta-analysis of stress on increased alcoholic beverage consumption behavior.

Author (Year)	Country	Sample	Study Design	Population	Intervention	Comparison	Outcome
Asfaw et al. (2021)	Ethiopia	523	Cross-sectional	College students aged 18-25 years	Stress and Anxiety	Not-Stressed	Alcoholic beverages consumption
Obeid et al. (2020)	Lebanon	789	Cross-sectional	Adults aged 18-30	Stress, anxiety, depression, Alexithymia	Not-Stressed	Alcoholic beverages consumption
Avery et al. (2020)	Washington	3,971	Cross-sectional	Adults aged 27-28	Stress and Anxiety	Not-Stressed	Alcoholic beverages consumption
Stanton et al. (2020)	Australia	1,490	Cross-sectional	Adults aged 18-50	Stress, Anxiety, Depression	Not-Stressed	Alcoholic beverages consumption
Verma et al. (2020)	India	354	Cross-sectional	Adults aged (18-41)	Stress, Anxiety, Depression	Not-Stressed	Alcoholic beverages consumption
Tesfahunegn & Gebremariam (2019)	Ethiopia	919	Cross-sectional	Early adults aged (20-25)	Stress	Not-Stressed	Alcoholic beverages consumption
Wolf et al. (2020)	Washington	342	Cross-sectional	Adults aged 18-45	Stress	Not-Stressed	Alcoholic beverages consumption

Table 3. Description of primary studies included in the meta-analysis of anxiety on increased alcoholic beverage consumption behavior.

Author (Year)	Country	Sample	Study Design	Population	Intervention	Comparison	Outcome
Asfaw et al. (2021)	Ethiopia	523	Cross-sectional	College students aged 18-25 years	Anxiety and Stress	Not Anxious	Alcoholic beverages consumption
Obeid et al. (2020)	Lebanon	789	Cross-sectional	Adults aged 18-30	Anxiety, Stress, Depression, Alexithymia	Not Anxious	Alcoholic beverages consumption
Avery et al. (2020)	Washington	3,971	Cross-sectional	Adults aged 27-28	Anxiety and Stress	Not Anxious	Alcoholic beverages consumption
Stanton et al. (2020)	Australia	1,490	Cross-sectional	Adults aged 18-50	Anxiety, stress, depression	Not Anxious	Alcoholic beverages consumption
Verma et al. (2020)	India	354	Cross-sectional	Adults aged (18-41)	Anxiety, Stress, Depression	Not Anxious	Alcoholic beverages consumption
Smith et al. (2020)	UK	932	Cross-sectional	Early Adults aged (18-25)	Anxiety	Not Anxious	Alcoholic beverages consumption
Jacob et al. (2020)	UK	691	Cross-sectional	Adults 18-34	Anxiety	Not Anxious	Alcoholic beverages consumption

Table 4. aOR and 95% CI data of stress on increased alcoholic beverage consumption behavior

(Author, year)	aOR	95% CI	
		Lower Limit	Upper Limit
Asfaw et al. (2021)	2.26	1.50	3.40
Obeid et al. (2020)	1.37	1.24	1.51
Avery et al. (2020)	1.11	0.50	2.47
Stanton et al. (2020)	1.00	1.07	1.13
Verma et al. (2020)	3.42	1.54	7.83
Tesfahunegn & Gebremariam (2019)	1.31	1.03	1.67
Wolf et al. (2020)	1.116	1.03	1.20

Table 5. aOR and 95% CI data of anxiety on increased alcoholic beverage consumption behavior

(Author, year)	aOR	95% CI	
		Lower Limit	Upper Limit
Asfaw et al. (2021)	1.50	0.94	2.21
Obeid et al. (2020)	3.33	2.67	4.15
Avery et al. (2020)	1.45	1.36	1.60
Stanton et al. (2020)	1.08	1.04	1.12
Verma et al. (2020)	2.62	1.361	5.048
Smith et al. (2020)	1.00	0.71	1.42
Jacob et al. (2020)	1.51	0.71	3.21

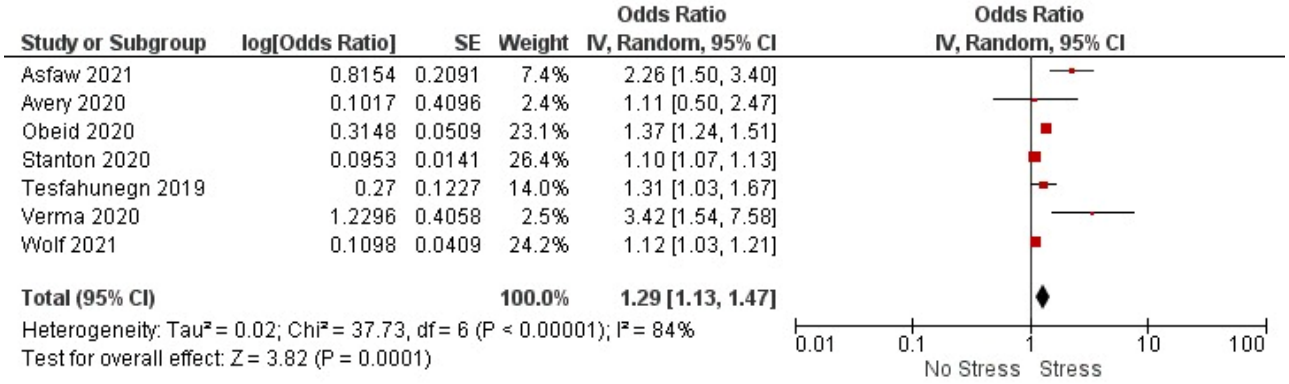

Figure 3. Forest Plot of the Effect of Stress on Alcoholic Beverage Consumption Behavior in Early Adults

The Forest Plot in figure 3 indicates the effect of stress on the consumption behavior of alcoholic beverages, which was statistically significant. People with high stress were 1.29 times more likely to have alcohol consumption behavior compared to those with low stress (1.29; CI 95%= 1.31-1.47; p<0.001). The Forest plot also indicates high heterogeneity of effect estimates across primary studies (I^2= 84%), p< 0.001 Thus, the average of effect estimates was calculated with a random effect model approach.

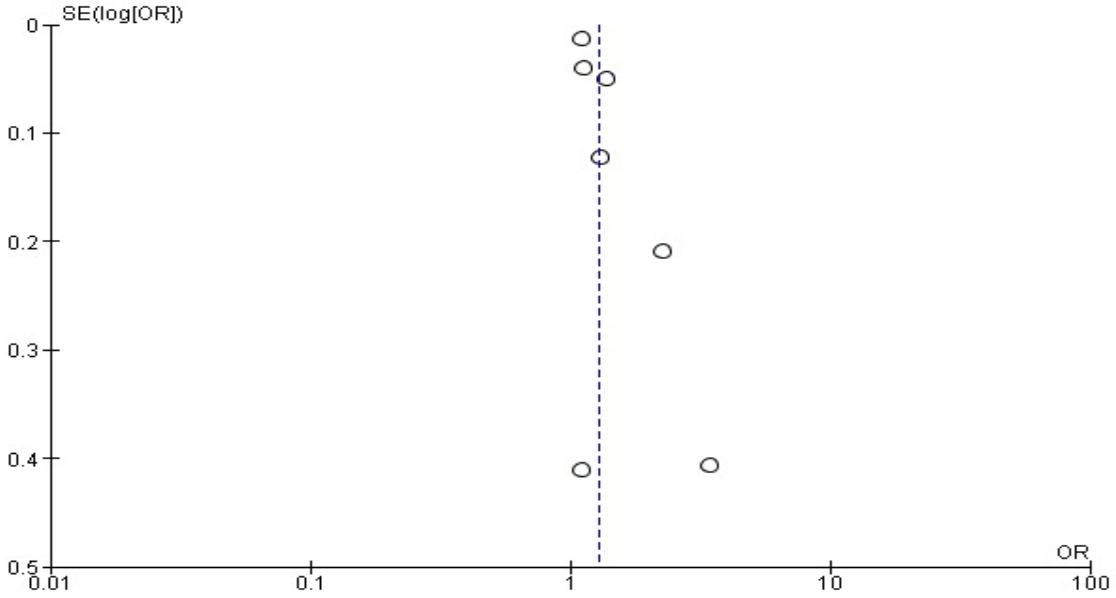

Figure 4. Funnel Plot of the Effect of Stress on Alcoholic Beverage Consumption Behavior in Early Adults

The Funnel Plot in figure 4 shows a fairly balanced distribution of the effect estimates across studies on the right and left of the vertical line of average estimation, thus in this meta-analysis, there was no publication bias. The plot on the right side of the chart appeared to have a standard error between 0.4 and 0 and the left plot had a standard error between 0. 5 and 0.

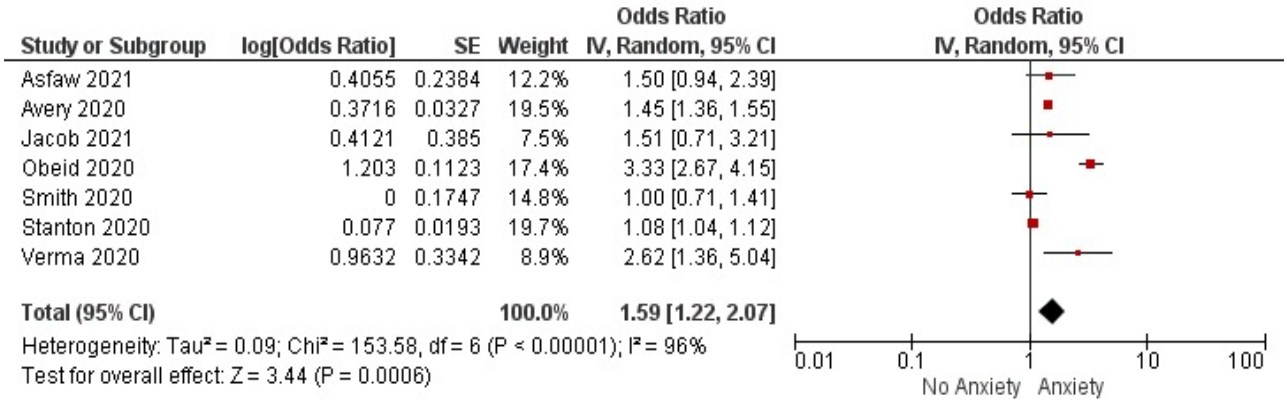

Figure 5. Forest Plot of the Effect of Anxiety on Alcoholic Beverage Consumption Behavior in Early Adults

The forest plot in figure 5 shows that there was an effect of anxiety on the consumption of alcoholic beverages, and is statistically significant. People with high anxiety were 1.59 times more likely to have alcohol consumption behavior than those with low anxiety (aOR= 1.59; CI 95%= 1.22-2.07; p= 0.001). The heterogeneity of effect estimates across studies was high (I2 = 96%), p< 0.001).

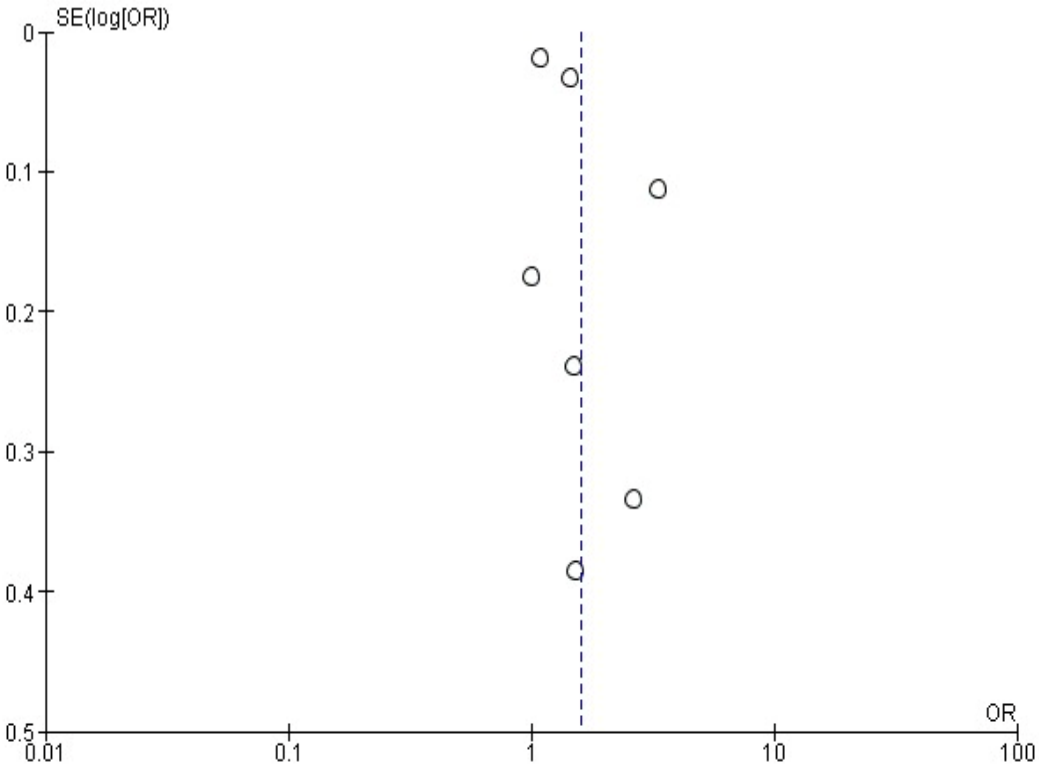

Figure 6. Funnel Plot of the Effect of Anxiety on Alcoholic Beverage Consumption Behavior in Early Adults

The plot funnel in figure 6 shows a balanced distribution of effect estimates to the right and left of the average vertical line thus this meta-analysis did not cause publication bias. The plot on the right side of the chart appeared to have a standard error between 0. 3 and 0 and the plot on the left had a standard error between 0. 4 and 0.

DISCUSSION

This systematic study and meta-analysis introduced the theme of the effect of stress and anxiety on the increased consumption of alcoholic beverages. The dependent variable analyzed was the consumption of alcoholic beverages. The independent variables analyzed were stress and anxiety. The study discussed stress and anxiety, which are social problems that can be experienced by every individual, especially early adults. Stress and anxiety are associated with coping motives of alcoholic beverage consumption behavior (Barta et al., 2019; de Matteis et al., 2017).

The confounding factor influencing the correlation or effect of exposure to the occurrence of disease by the study is not similar to the correlation or effect that occurs in the target population in other words, the study results are not correct or valid (Murti, 2018). The study with the systematic study and meta-analysis controlled the confounding factor that can be seen from the inclusion criteria of multivariate analysis study and the systematic results reported are adjusted odd ratio (aOR).

The results of the systematic study and meta-analyses were presented in the form of forest plots and funnel plots. Forest plots show an overview of information from each of the studies studied in meta-analysis and overall outcome estimation (Murti, 2018). The Forest plot visually shows the size of variation (heterogeneity) across

study results. A funnel plot is a diagram in a meta-analysis used to present the possibility of publication bias. The funnel plot indicates the relationship between the size of the study effect and the sample size of the effect magnitude of the various studies studied that can be measured in vari-ous ways (Murti, 2018).

A total of 9 primary study articles met the criteria including 2 articles from Africa, 2 from Asia, 2 from North America, 1 from Australia, and 2 from Europe.

1. Stress on Increased Alcoholic Beverage Consumption Behavior

A total of 7 articles of cross-sectional observational study as a source of meta-analysis of the effect of stress on increased consumption of alcoholic beverages in early adults. This study showed the results of the analysis that early adults who experienced stress had an increased risk of drinking behavior 1.29 times compared to early adults who did not experience stress and were statistically significant (aOR= 1.29; 95% CI= 1.31-1.47; p= 0.001). heterogeneity of study data showed I^2= 86% thus the data distribution was stated as heterogeneous (random effect model).

Stress increases the consumption behavior of alcoholic beverages in early adults, this result corresponds to the hypothesis. According to a study by Stanton (2020), a person with psychological stress (stress, anxiety, and depression) significantly affects health behaviors, one of which is the behavior of consuming alcoholic beverages. A person with a common mental disorder such as stress finds it difficult to express their emotions thus leading to a higher risk of excessive use or consumption of alcoholic beverages (Obeid, 2020).

Another study (Avery, 2020) reveals a significant association (aOR=1.37; Cl 95%= 1.24 to 1.51; p< 0.001) between stress and increased alcohol use which is also influenced by family problems. Alcohol consumption has effects on individuals, one of which is reducing the stress response and emotional memory of the body so individuals often consume alcohol to improve the emotions associated with traumatic events (Boscarino et al., 2011). Family problems and problems related to the workplace environment may worsen health conditions and increase alcohol consumption behavior (George, 2015). In line with a study conducted by Paulus (2017) firefighters have a higher risk for alcoholic beverage consumption behavior due to the level of stress and fatigue from working, they conduct coping by consuming alcoholic beverages to relieve stress.

2. Anxiety on Increased Alcoholic Beverages Consumption Behavior

A total of 7 cross-sectional observational research articles as a source of meta-analysis of the effect of anxiety on increased consumption of alcoholic beverages in early adults. This study showed the results of the analysis that early adults who experienced anxiety had a risk of increased alcohol consumption behavior by 1.59 times compared to early adults who did not experience anxiety and it was statistically significant (aOR= 1.59; 95% CI= 1.22 to 2.07; p< 0.001). The heterogeneity of the research data showed I2 = 96% thus the distribution of the data was heterogeneous (random effect model).

Anxiety has several levels from mild to severe. Anxiety was measured using a questionnaire and further observation using GAD-7 measurements. The Generalized Anxiety Disorder Assessment (GAD-7) is an instrument that has seven items used to measure or assess the severity level of a generalized anxiety disorder (GAD-7) (Mossman et.al, 2017).

Anxiety is a common psychological problem. Anxiety can be defined as a conti-

nuous feeling of worry, fear, and nervousness (Mental Health UK, 2020). Some literature suggests anxiety is associated with increased of alcohol consumption (Smith, 2020). Solving through the consumption of alcoholic beverages is one of the negative copings of taking a stand. It is conducted to alleviate worries in the body because the consumption of alcoholic beverages has a euphoria effect that causes momentary calm (Nurwijaya and Ikawati, 2009).

A study conducted by Jacob (2021) states that in the Lockdown situation it is identified that many people experience anxiety and depression because they have to be at home for a long time, this increases excessive alcohol consumption behavior significantly (aOR = 1.00; CI 95%= 0.71-1.42; P< 0.001). The level of anxiety experienced by a person can increase because it is directly related to alcohol addiction. A person who is addicted to alcohol usually has a bad mood at all times. Signs of anxiety are also increasingly visible if a person consumes alcohol excessively. Signs of anxiety that can appear consist of an unstable heartbeat and tend to be fast, nausea, and tremors (Ankrom, 2019).

AUTHOR CONTRIBUTION

Windya Kartika Paramita was the main researcher who selected topics, explored, and collected data. Hanung Prasetya and Argyo Dermatoto contributed to analyzing data and reviewing study documents

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CONFLICT OF INTEREST

There is no conflict of interest in this study.

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