Meta Analysis Study of Factors Relates Eating Disorders on Adolescents

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ABSTRACT

Eating disorders are one of the nutritional problems that occur on adolescents, especially in Indonesia. Various factors can cause eating disorders in adolescents. Research on factors related to eating disorders on adolescents has been available in Indonesia, but the results were varied, some were related and some were not. This research objective was to determine the factors relates with eating disorders on adolescents in Indonesia. Research methods with quantitative design and meta-analysis analysis techniques. This article is looking through PubMed, DOAJ, Garuda Portal, Google Scholar, and ISJD databases with time limits from 2000-2020. Data processing is done with the RevMan 5.4 application. The results obtained were 2,453 articles identified, there were 13 studies that were systematically reviewed and followed by a meta-analysis. A negative body image has a 3.40 times (95% CI 1.71-6.78) risk of eating disorders on adolescents. There is no significant correlation between nutritional knowledge, peers, and the mass media with eating disorders on adolescents in Indonesia. Body image is one of the factors for eating disorders on adolescents in Indonesia. It is expected that adolescents will adopt a healthy lifestyle and good eating behavior in order to get a positive body image and avoid eating disorders.

Studi Meta Analisis Faktor-Faktor yang Berhubungan dengan Gangguan Makan pada Remaja

ABSTRAK

Gangguan makan merupakan salah satu masalah gizi yang terjadi pada remaja terutama di Indonesia. Berbagai faktor dapat menyebabkan gangguan makan pada remaja. Penelitian mengenai faktor yang berhubungan dengan gangguan makan pada remaja sudah terdapat di Indonesia, tetapi didapatkan hasil yang bervariasi, ada yang berhubungan dan ada yang tidak berhubungan. Penelitian ini bertujuan untuk mengetahui faktor-faktor yang berhubungan dengan gangguan makan pada remaja di Indonesia. Metode penelitian dengan desain kuantitatif dan teknik analisis meta-analisis. Penelusuran melalui database PubMed, DOAJ, Portal Garuda, Google Schoolar, dan ISJD dengan batasan waktu dari tahun 2000-2020. Pengolahan data dilakukan dengan aplikasi RevMan 5.4. Hasil yang didapatkan sebanyak 2.453 artikel yang diidentifikasi, terdapat 13 penelitian yang ditelaah sistematis dan dilanjutkan dengan meta-analisis. Citra tubuh yang negatif berisiko 3,40 kali (95% CI 1,71-6,78) mengalami gangguan makan pada remaja. Tidak adanya hubungan yang signifikan antara pengetahuan gizi, teman sebaya, dan media massa dengan gangguan makan pada remaja di Indonesia. Citra tubuh merupakan salah satu faktor gangguan makan pada remaja di Indonesia. Diharapkan kepada

remaja untuk menerapkan pola hidup yang sehat dan perilaku makan yang baik agar mendapatkan citra tubuh yang positif dan terhindar dari gangguan makan.

INTRODUCTION

The genesis of eating disorders shows a trend of increasing prevalence on women. The study conducted by Galmiche found an increase in the prevalence of global eating disorders in the 2000-2006 period by 3.5% to 7.8% for the 2013-2018 period (Marie Galmiche, Pierre Déchelotte, & Grégory Lambert, 2019). Another study from several studies that have been conducted mainly in Asian countries regarding eating disorders, has also increased as explained by Fairburn that there is an increase in the prevalence of eating disorders in Asian populations (Ho, Tai, Lee, Cheng, & Liow, 2006). From several Asian countries it is known that Japan has the highest prevalence of eating disorders, followed by Hong Kong, Singapore, Taiwan and South Korea (Kathleen M. Pikecorresponding & PE, 2015). The results of the research show that the prevalence of young women in Singapore at risk for suffering from eating disorders is 7.4% (Ho et al., 2006)

The extent of the problem of eating disorders in Indonesia is not known with certainty due to the lack of research on this topic. However, from the results of research conducted independently in several cities in Indonesia, it is obtained an overview of the genesis of eating disorders, especially on adolescents. One of them is a study conducted on 70 South Jakarta State Senior High School (SMAN) students stated that more than 88.5% of students have eating disorders (Putra, 2008). Then a study on young women at SMAN 6 Jakarta Selatan found that 6.8% of girls suffered from anorexia nervosa, 50.0% suffered from bulimia nervosa, 6.4% suffered from binge eating disorder and 0.4% suffered from Eating Disorders Not Otherwise (EDNOS) (Ratnasari, 2012). In addition, research conducted at SMAN 1 Sleman Yogyakarta, obtained information that 5.1% of young women and 3.5% of young men experience eating disorders (Thompson, 2004). Furthermore, research at Vocational High School (SMAK) St. Stanislaus Surabaya showed that 85.7% had a low risk of experiencing eating disorders and 14.3% had a high risk of undergo eating disorders (Thompson, 2004).

The factors that cause a person to undergo eating disorders include; individual, family, biological, and psychological. More specifically, the causes of eating disorders are lack of self-confidence, unhealthy dietary behavior and attention to excessive body image (VI Ricket, 1996). Environmental influences such as the economic status of parents, groups or friends, advertisements in the mass media and the availability of various kinds of foods with unbalanced nutritional content can trigger changes in bad eating habits (Nindrea, 2016). Various studies examining the factors that cause eating disorders in adolescents in Indonesia have had mixed results. Therefore, more consistent results are needed regarding the factors associated with eating disorders by drawing conclusions and the need for inter-consistency between the same studies regarding factors associated with eating disorders in adolescents.

Based on the description above, in order to produce research that has strong inter-consistency and plays a role in the process of determining health policy, this meta-analysis research is needed to develop a factual study of eating disorders in adolescents in Indonesia. This research requires a conclusion from various existing studies, because the combination of the results of various studies is stronger than the results of a single study. Systematic reviews and meta-analyzes are research in an appropriate way to combine existing research into this correlation.

METHOD

The research used is a study with a quantitative design and meta-analysis techniques. The variables chosen were eating disorders (dependent) and body image, nutrition knowledge, mass media, peers and socio-economic variables (independent variables). The sample of this research is articles on factors related eating disorders on adolescents in Indonesia through the PubMed database, Google Scholar, Directory of Open Access Journals (DOAJ), Garba Digital Reference Portal (Garuda), and Indonesian Scientific Journal Database (ISJD) with a limit of 2000-2020. The keywords used for the search are ((eating disorder OR eating disorder OR eating behavior deviations OR disordered eating) AND (OR determinant factors OR determinant factor OR risk factor OR risk factor OR body image OR body image OR nutritional knowledge OR nutrition knowledge OR peers OR friends of the same age (peer) OR mass media OR mass media OR socio-economic OR social economy AND (cross sectional OR case control OR cohort) AND (regions in Indonesia)). In conducting searches, there are limitations, namely articles in English and Indonesian, adolescent research subjects, articles with research areas in Indonesia.

Analysis of data from this meta-analysis study, using software, namely Review Manager 5.4 (RevMan 5.4) (Nindrea, 2016) The analysis in this meta-analysis aims to obtain the value of the *pooled odss ratio estimate* using fixed effect model analysis and random effect model. In addition, the sensitivity test is carried out by comparing the results of the analysis with the fixed effect model and the random effect model.

RESULTS AND DISCUSSION

The results of the research found a number of 2,453 articles identified from the PubMed, Google scholar, DOAJ, Garuda, and ISJD databases. A brief study selection process can be seen in the following figure 1.
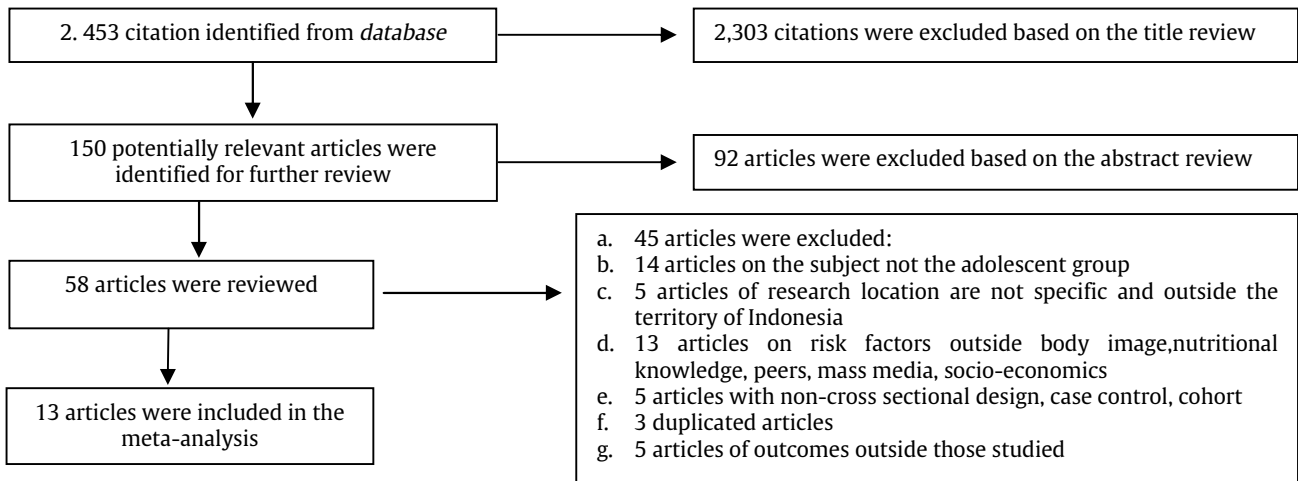
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┌─────────────────────────────────┐        ┌─────────────────────────────────────┐
│ 2. 453 citation identified from  │───────▶│ 2,303 citations were excluded based  │
│           database               │        │       on the title review            │
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│ 150 potentially relevant articles│───────▶│ 92 articles were excluded based on   │
│  were identified for further     │        │       the abstract review            │
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│  58 articles were reviewed       │───────▶│ a. 45 articles were excluded:        │
└─────────────────────────────────┘        │ b. 14 articles on the subject not    │
                │                            │    the adolescent group             │
                ▼                            │ c. 5 articles of research location   │
┌─────────────────────────────────┐        │    are not specific and outside the │
│ 13 articles were included in the │        │    territory of Indonesia           │
│         meta-analysis            │        │ d. 13 articles on risk factors       │
└─────────────────────────────────┘        │    outside body image,nutritional   │
                                             │    knowledge, peers, mass media,     │
                                             │    socio-economics                   │
                                             │ e. 5 articles with non-cross         │
                                             │    sectional design, case control,  │
                                             │    cohort                            │
                                             │ f. 3 duplicated articles             │
                                             │ g. 5 articles of outcomes outside    │
                                             │    those studied                     │
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Figure 1
Flow Chart of Study Selection Factors Relates Eating Disorders on Adolescents in Indonesia

In Figure 1 above, it can be seen that the screening process is based on a review of titles and abstracts, so a total of 2,303 articles were excluded from this study because they were not relevant to the study. A total of 58 articles were identified in full-text form and only 13 articles were included in the systematic review and 45 articles were excluded. The articles that were excluded were due to several reasons, namely; 14 articles with the subject were not adolescent groups, 5 articles of research location were not specific and outside the territory of Indonesia, 13 articles were excluded because of risk factors outside of body image, nutritional knowledge, peers, mass media, socio-economics, 5 articles were excluded because the research design was not cross sectional , case control, cohort, 3 articles were excluded because of duplication, and 5 articles were excluded because of outcomes outside those studied.

Table 1
Forest Plot Correlation between body image with eating disorder on adolescent used Random Effect Model

Researcher	Eating disorder		No eating disorder		OR
	Negative	Total	Positive	Total	
Laila (2013)	31	57	52	63	0,25
Dwintasari (2018)	25	52	18	39	1,08
Ratnasari (2012)	64	159	23	91	1,99
Erdiantono (2009)	13	24	14	43	2,45
Sulistyan (2016)	14	15	91	108	2,62
Santi (2012)	80	100	50	83	2,64
Kurniawan et al (2014)	1	8	3	95	4,38
Rachmat (2012)	60	98	4	17	5,13
Tumenggang et al (2018)	22	32	81	318	6,44
Putra (2008)	156	232	7	30	6,74
Purba (2012)	24	25	19	25	7,58
Siregar (2017)	8	8	22	48	20,02
Syifa et al (2017)	94	95	48	106	113,58
Total (95%CI)	**905**		**1066**		**3,40**
Total events	592		432		

Heterogeneity : $Tau^2 = 1,13$; $Chi^2 = 63,99$, df = 12(P<0.00001), $I^2 = 81\%$
Test for overall effect: Z = 3,47 (P = 0,0005)

Based on the results of the analysis using the random effect model, it is known that the pooled odds ratio is 3.40 with a 95% CI, namely 1.71-6.78 (Table 1). From these results it can be concluded that adolescents who undergo negative body image distortion / feel themselves fat have an eating disorder risk of 3.40 times greater than adolescents who do not experience positive body image distortion / adolescents who do not feel fat. The results of the analysis indicated that there was a significant correlation between body image factors and eating disorders in adolescents as evidenced by a p value <0.05, namely p = 0.0005.

Research conducted by the National Eating Disorder Association (2005) states that someone who has a negative body image is more likely to experience eating disorders and suffer from more depression, lack of self-confidence and have a higher desire to lose weight. This study is in line with a meta-analysis study by Walker et al that analyzed 17 articles on the relationship between body image and eating disorders, showing a significant relationship that individuals who experience negative body image distortion have an increased risk of eating disorders compared to individuals who do not undergo negative body image distortion.

The body image factor plays a role in eating disorders on adolescents because adolescents who experience negative body image distortion will really pay attention to their body shape and weight. These adolescents feel themselves fat and do various ways to achieve the desired weight and body shape, one of which is by changing their eating behavior. The application of a bad diet continuously will lead to eating disorders in adolescents. Furthermore, this condition will have an impact on the nutritional status of adolescents (Nini Rahmi, 2009). Poor application of diet can be seen from the food choices consumed by adolescents. Especially for adolescent girls, the results of the study showed that there was less variation in the food chosen and consumed compared to male adolescents, especially in relation to restrictions on foods that contain calories which can affect their body condition. Girls tend to pay more attention to body image than boys (Azrimaidaliza & Purnakarya, 2011).

Table 2
Forest plot correlation between nutritional knowledge with eating disorder on adolescent used random effect mode

Reasearcher	Eating Disorder		No Eating Disorder		OR
	Low	Total	High	Total	
Laila (2013)	22	57	32	63	0,61
Tumenggang et al (2018)	15	32	128	318	1,31
Santi (2012)	22	100	13	83	1,52
Ratnasari (2012)	130	159	63	91	1,99
Total (95%CI)	**189**		**555**		**1,30**
Total events	189		236		
Heterogeneity : Chi^2 = 6,29 , df = 3 (P = 0,10), I^2 = 52%					
Test for overall effect: Z = 1,48 (P = 0,14)					

Another factor that is thought to be associated with eating disorders on adolescents is nutritional knowledge. The results of the analysis with the type of fixed effect model according to Table 2 above, show that the variations in the study are homogeneous. This can be seen from the p value in the large heterogeneity test of 0.05 (p> 0.05), namely p = 0.10. The results of the analysis using the fixed effect model resulted in a pooled odds ratio of 1.30 (95% CI 0.92-1.83). From these results it can be concluded that there is no significant correlation between nutritional knowledge and eating disorders on adolescents, this is evidenced by the p value on the test for overall effect greater than 0.05 (p> 0.05), namely p = 0, 14.

A person's knowledge will affect attitudes and behavior in choosing food based on types in terms of quality, variety and presentation of food, for example physical needs that continue to the person's nutritional state. The results of this study, in line with research by Aini, suggest that there is no significant correlation between nutritional knowledge and eating disorders on adolescents.

Aini explained that high / good nutritional knowledge does not necessarily make a person's standard not to experience eating disorders, but is caused by the desire of the adolescent to have the desired body shape and physical appearance or become a perfectionist (Aini, 2009). The reason for the absence of a significant correlation in this study is because the research article data obtained has a weak relationship or the research article obtained has a low quality final result so that it may affect the results of the correlation between the two factor.

Table 3
Forest plot correlation between mass media with eating disorder on adolescent used random effect model

Researcher	Eating Disorder		No Eating Disorder		OR
	Affect	Total	Not Affect	Total	
Laila (2013)	22	57	38	63	0,41
Tumenggang et al (2018)	20	42	74	318	3,00
Total (95%CI)	**99**		**381**		**1,12**
Total events	42		112		
Heterogeneity : Tau^2 = 1,84; Chi^2 = 15,55 , df = 1 (P < 0.0001), I^2 = 94%					
Test for overall effect: Z = 0,12 (P = 0,91)					

Based on Table 3, it can be seen that the analysis with the random effect model resulted in a pooled odds ratio of 1.12 (95% CI 0.16-7.84). From the results of this analysis, it can be concluded that there is no significant correlation between mass media and eating disorders on adolescents. This can be proven by the p value on the test for overall effect greater than 0.05 (p> 0.05), namely p = 0.91.

This research is in line with the research conducted by Goi which found no correlation between media exposure and eating disorders. In contrast to the research obtained by Gonzalez et al, who found that mass media plays a role in the occurrence of eating disorders. Research conducted by Field et al (Field & et, 2008) states that the media is an independent predictor of the onset of eating disorders. Mass media has an important role, where teenagers tend to want to appear more attractive and have a body like what they see in mass media in the form of print and electronic media.

The reason there is no significant correlation is due to variations between studies. Variations between studies led to inconsistent results, where the final results of the research articles included in the meta-analysis showed a weak association or poor quality of the research articles. The result affects the end result of this study which shows no correlation.

Tabel 4
Forest Plot Correlation between Peers with eating disorder on adolescent used Random Effect Model

Researcher	Eating Disorder		No Eating Disorder		OR
	Affect	Total	Not Affect	Total	
Santi (2012)	27	100	58	83	0,16
Ratnasari (2012)	123	159	59	91	1,85
Laila (2013)	48	57	26	63	7,59
Total (95%CI)	316		237		1,29
Total events	198		143		
Heterogeneity : Tau^2 = 3,29; Chi^2 = 56,54 , df = 2 (P < 0.00001), I^2 = 96%					
Test for overall effect: Z = 0,24 (P = 0,81)					

Based on Table 4, it can be seen that the analysis with the random effect model resulted in a pooled odds ratio of 1.29 (95% CI 0.16-10.46). From the results of this analysis, it can be concluded that there is no significant correlation between peers and eating disorders in adolescents. This can be proven by the p value on the test for overall effect greater than 0.05 (p> 0.05), namely p = 0.81.

The results of this research are different from research conducted by Sasmita, which found correlation between peer factors and eating disorders on adolescents (Sasmita, 2014). Adolescence is a period when it is very vulnerable to be influenced by the environment, one of which is peers. One of the environmental influences that have a big influence on adolescents is in terms of controlling body weight, especially in young women. The existence of criticism from peers related to body shape, height and weight plays a role in the adolescent's perception of their physical appearance, in addition to trends and role models among adolescents, especially models, artists to have an ideal body, namely with a thin and slender body.

In controlling their weight, adolescents will equate the perception of the wrong ideal body shape, as a result there is an effort to compete to become who is thinner among them. The wrong perception of the ideal body among peers will change their eating behavior, this is done in order to control their weight which does not look fat. In this study, it can be concluded that there is no significant correlation between peers and eating disorders due to variations between studies.

Table 5
Comparison of Pooled Odds Ratio Estimate between Fixed Effect Model dengan Random Effect Model

No	Research Variables	n	Fixed Effect Model		p Heterogeneity	Random Effect Model	
			OR	95%CI		OR	95%CI
1.	Body Image	13	2,92	2,29-3,71	<0,00001	3,40	1,71-6,78
2.	Nutritional Knowledge	4	1,30	0,92-1,83	0,10	1,27	0,77-2,11
3.	Peers	2	1,16	0,72-1,87	<0,0001	1,12	0,16-7,84
4.	Mass Media	3	1,02	0,73-1,43	<0,00001	1,29	0,16-10,46

Based on Table 5, it can be seen that the results of the comparison analysis using the fixed effect model and the random effect model produce different pooled odds ratio values. In the relationship between body image factors, peer factors, and mass media factors with eating disorders in adolescents, there are significant and heterogeneous variations between studies and it can be seen that there is an increase in the value of the pooled odds ratio from the fixed effect model to the random effect model with the confident interval value which is getting wider. The correlation between nutritional knowledge and eating disorders on adolescents has variations between studies that are not meaningful and are homogeneous. Thus the value of the pooled odds ratio between the fixed effect model and the random effect model shows that the results are not much different.

CONCLUSIONS AND SUGGESTIONS

The results of this research by analyzing 13 research articles that met the criteria of a meta-analysis study showed that adolescents with negative body image had 3.40 times the risk of experiencing eating disorders compared to adolescents with positive body image. It is necessary to carry out educational activities for adolescents regarding the concept of body image, eating disorders and its relation to nutritional status and reproductive health. It is expected that cooperation between health education institutions and health institutions can improve in quality and quantity in an effort to overcome nutrition and health problems on adolescents.

Conflicting of Interests Statement

The authors declared that no potential conflicts of interests with respect to the authorship and publication of this article.

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