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Meta-Analysis

Meta-Analysis Study: Is Dental Health Education Effective to Improve Knowledge, Attitude, and Behavior in Adolescents?

Danti Narulita, Danu Aprilianto

Health Polytechnics, Ministry of Health Surakarta

ABSTRACT

Background: Good oral and dental health can help a person chew, talk and socialize with confidence without any discomfort. Teenagers are the next generation of the nation starting from the age of about 12 years to 20 years. At the age of adolescence, deciduous teeth have been replaced by permanent teeth so it is necessary to pay attention to the maintenance of teeth and mouth. This study aimed to analyze the effect of Dental Health Education (DHE) on the knowledge, attitudes and behavior of adolescents.
Subjects and Method: This research is a meta-analysis study using PRISMA flowchart guidelines. The search for articles was carried out by considering the eligibility criteria determined using the following PICO model: Population= teenagers, Intervention= DHE (dental health education), Comparison= without DHE, Outcome= Knowledge, attitudes and behavior The article search process was carried out between 2020-2021 using a database from PubMed, Google Scholar, Mendeley and the Wiley Online Library. Based on the database, there were 7 articles that met the inclusion criteria. The analysis was carried out using RevMan 5.3 software.
Results: A total of 7 articles reviewed in the meta-analysis showed that Dental Health Education (DHE) increased knowledge (SMD= 0.63; 95% CI= 0.53 to 0.73; p<0.001), attitudes (SMD= 0.41; 95% CI= 0.32 to 0.51; p<0.001) and behavior (SMD= 0.21; 95% CI= 0.11 to 0.32; p<0.001) adolescent.
Conclusion: The influence of dental health education increase knowledge, attitudes and behavior among adolescents.

Keywords: knowledge, attitude, practice, adolescent, dental health education

Correspondence:
Danti Narulita. Health Polytechnics, Ministry of Health Surakarta. Jl. Letjen Sutoyo, Mojosongo, Jebres, Surakarta, Central Java 57127. Email: sitimaratul08@gmail.com. Mobile: +62821-3329-5468.

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BACKGROUND

Good oral and dental health can help a person to chew, talk and socialize confidently without any discomfort (Almabadi., et al 2021. Overall health, well-being, education and development of children, families and communities can be affected by oral health (Almabadi., et al 2021).

Panjaitan et al., 2018 stated dental caries is a chronic disease that affects 60% to 90% of school children and adults worldwide (Chabuk, 2021). The World Health Organization states that around the world, 60-90% of school children have cavities, while according to data from the Indonesian Dental Association states that at least 89% of caries sufferers are children. Until now,

dental caries is a health problem in both developed and developing countries (Sari et al., 2021).

Dental caries became a global problem with an impact of 2.4x109 in adults in 2010 (Alshaad., et al 2020). The results of the 2017 Basic Health Research (RISKESDAS) show that the caries rate of the Indonesian population aged over 12 years assessed using the DMF-T index is 4.6. This means that the tooth decay of the Indonesian population is 460 teeth per 100 people (Panjaitan et al., 2018).

Teenagers are the next generation of the nation starting from the age of about 12 years to 20 years. At the age of adolescence, deciduous teeth have been replaced by permanent teeth so that it is necessary to pay attention to the maintenance of teeth and mouth (Yasin et al., 2021).

Health promotion and disease prevention are a number of activities aimed at and designed to improve personal and community health through a combination of strategies, including the implementation of behavior change, health education, health risk detection and health promotion and maintenance (Nubatonis and Ayatulah, 2019).

Dental and oral health efforts are reviewed from various aspects, namely the environment, knowledge, education, awareness from the community and prevention with appropriate actions (Notohartojo, 2013). Knowledge of dental health can determine a person's dental and oral health status which will be a predisposing factor for behavior change (Panjaitan., et al 2018). Behavior is formed from knowledge which is a very important cognitive domain in the occurrence of an action (Handayani and Arifah, 2016).

Based on the description above, it shows that the caries rate is still high in adolescents so that researchers are interested in conducting a meta-analysis of the effect of DHE (Dental Health Education) on knowledge, attitudes and behavior in adolescents.

SUBJECTS AND METHOD

1. Study Design

This research was conducted using a meta-analysis research design with the PRISMA flowchart guideline. Search articles using the following databases: PubMed, Google Scholar, Mendeley and Wiley Online Library. Some of the keywords used are: DHE AND Knowledge, Attitude, Practice OR DHE.

2. Inclusion Criteria

The inclusion criteria of this research article were Randomized Controlled Trial (RCT) articles, articles using English, Standardized Mean Difference (SMD) relationship measures, adolescent subjects, results of knowledge, attitudes and behavior.

3. Exclusion Criteria

The exclusion criteria for this research article are the results of bivariate statistical analysis, and articles that do not use English.

4. Operational Definition of Variables

The articles included in this study were PICO-adjusted. The search for articles was carried out by considering the eligibility criteria determined using the following PICO model: Population = teenagers, Intervention= dental health education, Comparison= without DHE, Outcome= Knowledge, attitudes and behavior.

DHE (Dental Health Education) is a dental and oral health counseling activity with the aim of providing an understanding of the importance of taking care of dental and oral health from an early age.

Knowledge is the result of the curiosity of the sensory process towards a particular object.

Attitude is a comprehensive assessment of the actions taken.
Behavior is a form of action-reaction that is influenced by the environment.

5. Instruments

Research is guided by the PRISMA flow diagram and assessment of the quality of research articles using the Critical Appraisal Skills Program (CASP, 2020) tool.

6. Data Analysis

Articles were analyzed using the Review Manager (RevMan) 5.3 application. The results of data processing are presented in the form of forest plots and funnel plots.

RESULTS

Process of searching article wascarried out by searching several journal databases Googlescholar, PubMed, and Scopus it can be seen using the PRISMA FLOW flowchart shown in Figure 1.

The initial search for articles sourced from various databases obtained initial results of 1,491 articles, after filtered again by checking for duplicates, suitability of the title and abstract and the last is checking the full text, obtained 7 articles that meet the inclusion and exclusion criteria that have been set previously.

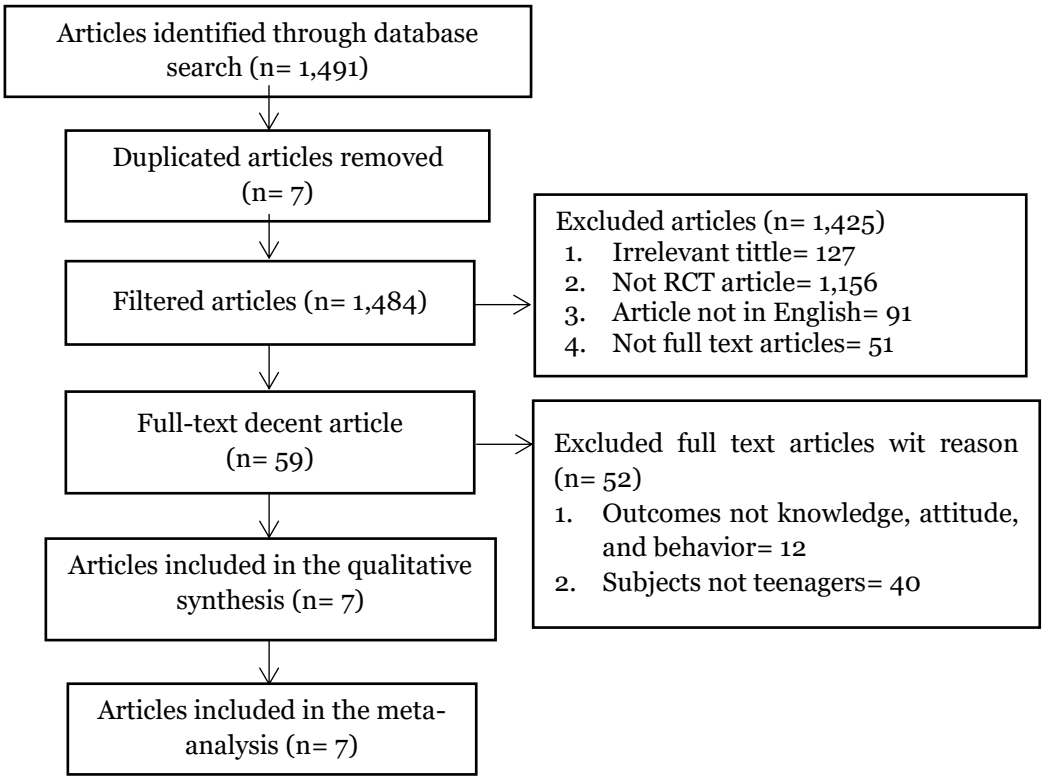

Figure 1. Results of Prisma Flow Diagrams

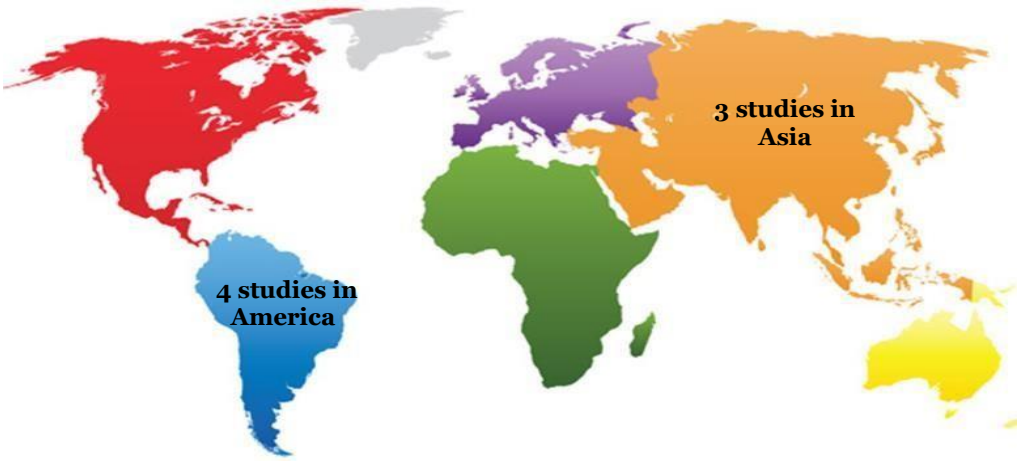

Figure 2. Resarch Distribution Map

Figure 1 Research related to dental health education effective to improve knowledge, attitude, and behavior in adolescents consisted of 7 articles from the initial search process yielding 1,491 articles, after the deletion process, articles were published with 59 requirements for full-text review more carry on. A total of 7 articles that met the quality assessment were included in the quantitative synthesis using a meta-analysis.

It can be seen in Figure 2 that the research articles come from five continents such as Asia and America.

An assessment of the quality of the articles used in this study can be seen in table 1. Then Table 2 shows that 7 articles from a randomized controlled trial study provide evidence about dental health education effective to improve knowledge, attitude, and behavior, also in table 2 it can be seen about the details of the articles used in this study, such as the study population, intervention, comparison, and the results of each study. All articles used in this study are articles with a randomized controlled trial study design.

Based on the results of the forest plot (figure 3) of the randomized controlled trial study design, showed that DHE affects adolescent knowledge 0.63 times compared to no DHE (SMD= 0.63; 95% CI= 0.53 to 0.73), and the results were statistically significant ($p < 0.001$).

In figure 4 it can be seen about the funnel plot from the results of the data analysis that has been carried out, where it can be seen that there is no publication bias which is indicated by a symmetrical distribution with 7 plots touching the vertical line, if it touches the vertical line there is no bias.

Table 1. Assessment of study quality published by Critical Appraisal Skilss Program (CASP)

No	Indicator	Publication (Author and Year)						
		D'Cruz et al. (2012)	Naidu *et al.* (2015)	Vangipuram et al. (2016)	Marchetti et al. (2021)	Salahsour et al. (2019)	Alrashadi et al. (2020)	Subedi et al. (2021)
1	Does this research clearly address the focused problem?	2	2	2	2	2	2	2
2	Was the group recruited in an acceptable way?	3	3	3	3	3	3	3
3	Is social support accurately measured to minimize bias?	2	2	3	2	2	2	2
4	Was the outcome (smoking habit) measured accurately to minimize bias?	3	3	3	3	3	3	3
5	Did the authors identify all the important confounding factors?	3	3	3	3	3	3	3
6	Was the subject follow-up complete enough? Was the follow-up of the subject long enough?	3	3	3	3	3	3	3
7	Are the results of this study reported in aOR?	2	2	3	2	2	2	2
8	What is the precision of the result?	1	1	1	2	1	1	1
9	Do you believe the results?	2	2	2	2	3	2	2
10	Can the results be applied to local residents?	2	2	2	2	3	2	2
11	Are the results of this study consistent with other available evidence?	2	2	2	2	2	2	2
12	What are the implications of this research for practice?	2	2	2	2	2	2	2
Total		**27**	**27**	**29**	**28**	**29**	**27**	**27**

Note: Answer 1= hesitant, Answer 2= Yes; Answer 3= No

Table 2. Description of Primary Research included in the Meta-Analysis

No	Author (Year)	Country	Study Design	Sample		Population (P)	Inter-vention (I)	Compa-rison (C)	Outcome (O)	Mean		SD	
				DHE	Not DHE					DHE	Not DHE	DHE	Not DHE
1	D'Cruz et al. (2012)	India	RCT	150	300	Teenagers aged 13-15 yrs	DHE	Without DHE	Knowledge, Attitude and Behavior	1.17, 1.17, 6.84.	1.62, 1.62, 6.21.	3.89, 3.89, 1.12.	3.77, 3.77, 1.69
2	Naidu *et al.* (2015)	Trinidad and Tobago	RCT	25	54	Teenagers aged 18-24 yrs	DHE	Without DHE	Knowledge, Attitude and Behavior	11.70, 13.09, 13.09.	16.70, 10.55, 10.55	11.70, 1.44, 4.07	16.70, 4.07, 1.44
3	Vangipuram *et al.* (2016)	Bengaluru	RCT	150	150	Teenagers 12-15 years old	DHE	Without DHE	Knowledge, Attitude and Behavior	0.86, 1.57, 1.56	0.85, 1.42, 1.41.	0.54, 0.65, 0.67.	0.52, 0.69, 0.72.
4	Marchetti *et al.* (2021)	Brazil	RCT	147	141	Teenagers aged 14-19 yrs	DHE	Without DHE	Knowledge, Attitude and Behavior	16.03, 16.03, 1.34	16.06, 15.98, 0.26.	1.16, 1.16, 0.26.	1.20, 1.13, 0.19.
5	Salahsour *et al.* (2019)	Iran	RCT	234	236	Teenagers aged 9-11 yrs	DHE	Without DHE	Knowledge, Attitude and Behavior	7.18, 10.94, 9.61	2.52, 8.29, 13.35.	2.50, 3.10, 2.10.	1.20, 2.30, 4.40.
6	Alrashadi et al. (2020)	Texas	RCT	31	35	12 yrs old teenager	DHE	Without DHE	Knowledge, Attitude and Behavior	0.42, 0.04, 0.06.	0.02, 0.13, 0.01	0.93, 0.27, 0.16.	0.04, 0.01, 0.11.
7	Subedi *et al.* (2021)	Nepal	RCT	120	120	Teenagers 12-15 years old	DHE	Without DHE	Knowledge, Attitude and Behavior	9.71, 3.48, 4.51.	6.13, 2.50, 3.18.	1.10, 0.69, 1.03.	1.71, 0.79, 1.31.

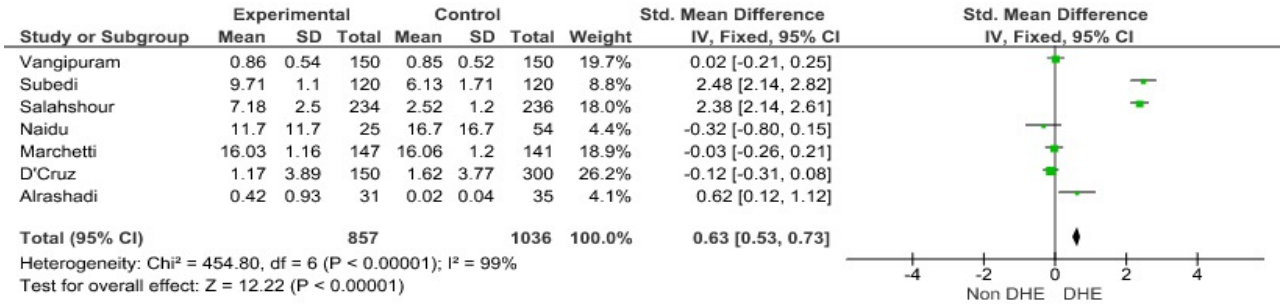

Figure 3. Forest plot of the effect of dental health education on knowledge in adolescents

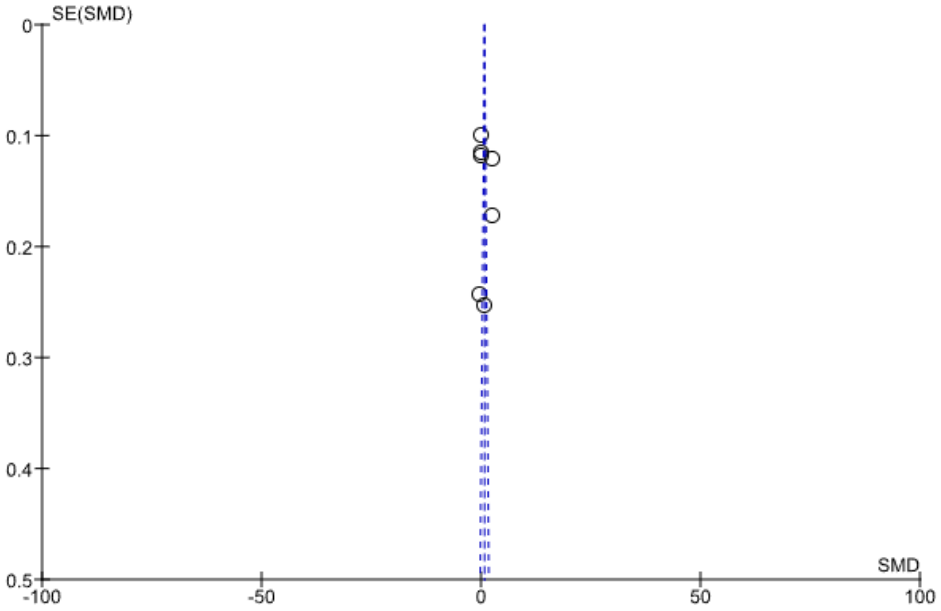

Figure 4. Funnel plot of the effect of dental health education on knowledge in adolescents

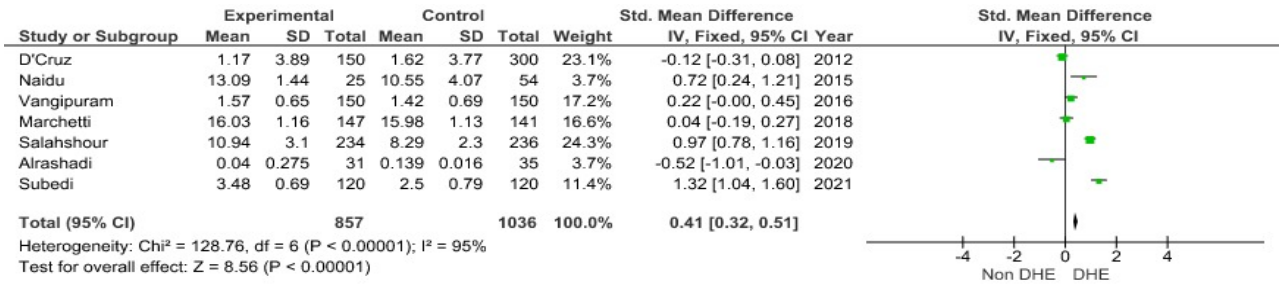

Figure 5. Forest plot of the effect of dental health education on attitudes in adolescents

Based on the results of the forest plot figure 5 of the randomized controlled trial study design, showed that DHE affects adolescent attitudes 0.41 times compared to no DHE (SMD= 0.41; 95% CI= 0.32 to 0.51), and the results were statistically significant (p < 0.001).

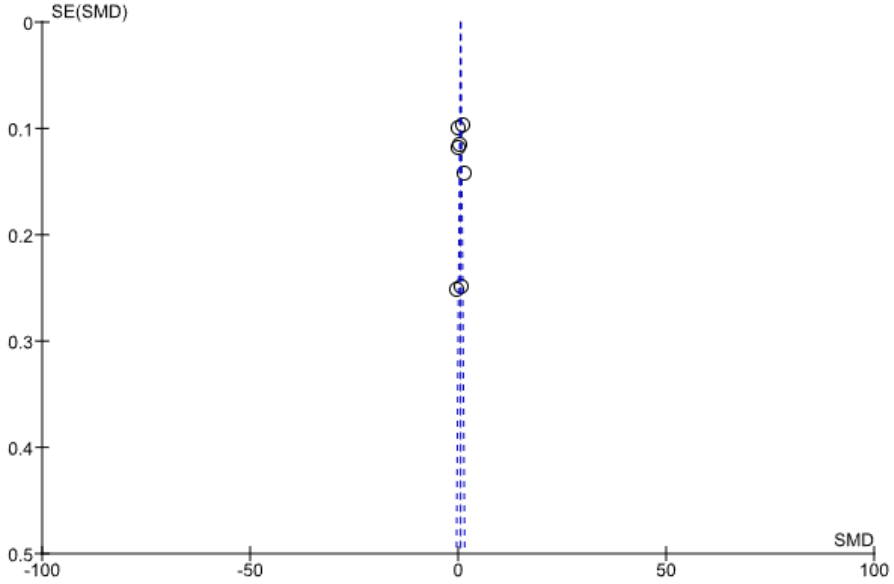

Figure 6. Funnel plot of the effect of dental health education on attitudes in adolescents

In figure 6 it can be seen about the funnel plot from the results of the data analysis that has been carried out, where it can be seen that there is no publication bias which is indicated by a symmetrical distribution with 7 plots touching the vertical line, if it touches the vertical line there is no bias.

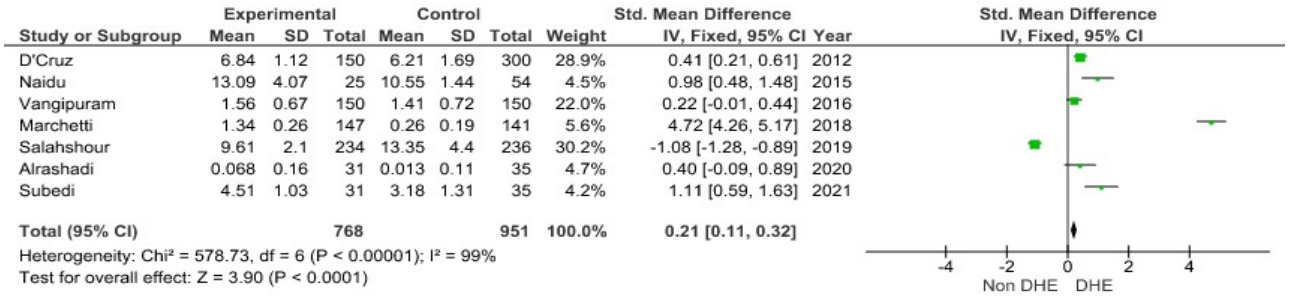

Figure 7. Forest plot of the effect of dental health education on behavior in adolescents

Based on the results of the forest plot figure 7 of the randomized controlled trial study design, showed that DHE affects adolescent behavior 0.21 times compared to no DHE (SMD= 0.21; 95% CI= 0.11 to 0.32), and the results were statistically significant (p < 0.001).

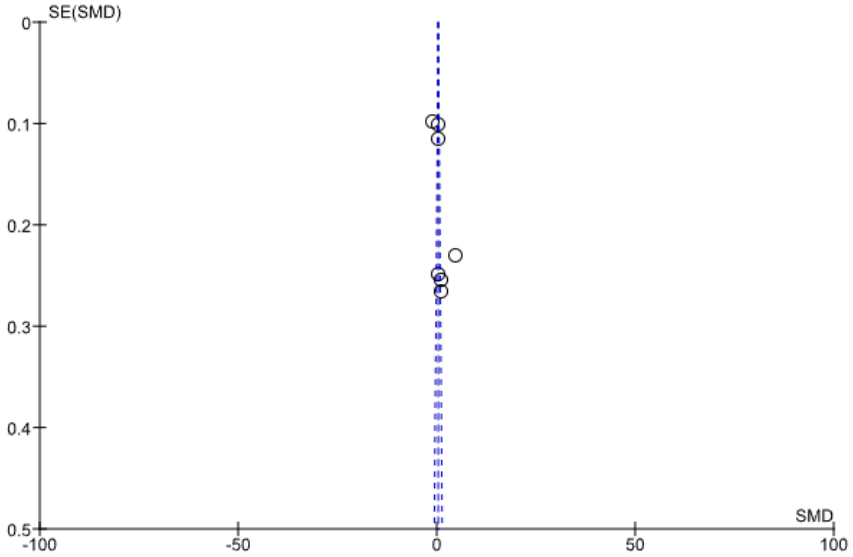

Figure 8. Funnel plot of the effect of dental health education on Behavior in adolescents

In figure 8 it can be seen about the funnel plot from the results of the data analysis that has been carried out, where it can be seen that there is no publication bias which is indicated by a symmetrical distribution with 7 plots touching the vertical line, if it touches the vertical line there is no bias.

DISCUSSION

This systematic study and meta-analysis raised the theme of the effect of DHE (Dental Health Education) on knowledge, attitudes and behavior towards adolescents. The independent variable analyzed was DHE (Dental Health Education). The dependent variables analyzed were knowledge, attitudes and behavior. This study discusses DHE (Dental Health Education), this is considered important because the oral cavity affects the health of the body, if someone has a toothache it will affect other body parts (Ulliana., et al 2021)

The primary study that met the criteria was 7 articles, which obtained 7 articles spread across 2 continents, namely America and Asia. This study shows that DHE (Dental Health Education) is statistically significant in influencing the knowledge, attitudes and behavior of adolescents. The results of the forest plot showed that DHE (Dental Health Education) had an effect on the knowledge of adolescents as much as 0.63 times compared to without DHE (Dental Health Education) (SMD= 0.63; 95% CI= 0.53 to 0.73), and the results were statistically significant (p <0.01). DHE had an effect on adolescent attitudes as much as 0.41 times compared to without DHE (SMD= 0.41; 95% CI= 0.32 to 0.51), and the results were statistically significant (p< 0.001).

DHE had an effect on adolescent behavior 0.63 times compared to no DHE (SMD= 0.21; 95% CI= 0.11 to 0.32), and the results were statistically significant (p< 0.001). The heterogeneity of the research data shows I^2 = 95% and 99% so that the distribution of the data is declared homogeneous (fixed effect model).

DHE (Dental Health Education) can improve knowledge, attitudes and behavior in adolescents. These results are in accordance with the hypothesis. According to research by Subedi et al. (2021) DHE is effective

in increasing knowledge, attitudes and behavior towards oral hygiene in adolescents.

Research Vangipuram et al. (2016) the knowledge of adolescents increased in maintaining oral hygiene compared to the control group. Attitudes about brushing teeth can prevent tooth decay and gum disease by "drinking water after eating" is more increased than the control group. The behavior of adolescent children to consume chocolate, biscuits, snacks was reduced compared to the control group.

The research of Salahsohour et al. (2019) stated that there were significant differences in knowledge, attitudes and behavior in the experimental and control groups. This is in line with research by Ghaderi et al., 2017 which showed DHE (Dental Health Education) was effective in promoting dental and oral health in students. DHE (Dental Health Education) in promoting dental and oral health is effective in increasing knowledge, attitudes and behavior in elementary school children.

The challenges of modern society in the learning process in adolescents need to be more interesting and adapt to adolescent changes (Garbin et al., 2021).

Dcruz's research (2012) shows that DHE (Dental Health Education) has an impact on increasing knowledge, attitudes and behavior significantly in adolescents in maintaining oral and dental health. DHE (Dental Health Education) is a plan of learning activities to maintain dental and oral health (Dcruz 2012).

The results of this study are not in line with the research of Alrashadi et al. (2021) DHE (Dental Health Education) does not show an increase in knowledge, attitudes and behavior in adolescents

AUTHOR CONTRIBUTION

Danti Narulita and Danu Aprilianto were the main researchers who chose the topic, searched for and collected research data. Siti Mar'atul Munawaroh analyzes data and examines research documents.

FUNDING AND SPONSORSHIP

This study is self-funded.

CONFLICT OF INTEREST

There is no conflict of interest in this study.

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