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The Difference in Effectiveness of Booklet and Video Media Education on Balanced Nutrition Knowledge of Caregivers for Children with Autism Spectrum Disorder in Jabodetabek Area

Perbedaan Efektivitas Edukasi Media Booklet *dan* Video *terhadap Pengetahuan Gizi Seimbang Pendamping Anak* Autism Spectrum Disorder *di Wilayah Jabodetabek*

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ABSTRACT

Background: Children with Autism Spectrum Disorder (ASD) require adequate and proper balanced nutrition to support their growth, development, and to prevent nutritional problems. One of the factors influencing nutritional problems is the lack of knowledge among caregivers. Nutrition education can be applied to improve the knowledge of caregivers of children with ASD about balanced nutrition. The use of educational media in the form of booklet and video are considered effective. However, the differences in effectiveness between the two media needs to be analyzed.
Objectives: To determine the differences in the effectiveness of booklet and video media education on the balanced nutrition knowledge among caregivers of children with ASD in the Jabodetabek area.
Methods: This study used a quasi-experimental design with a two-group pre-test post-test design. The sample was caregivers of children with ASD in Jabodetabek area who met inclusion and exclusion criteria, totalling 60 people each in the control and experimental group. The sampling technique was cluster sampling with a research instrument in the form of a questionnaire. Data analysis was conducted using univariate analysis and bivariate analysis was conducted using Mann-Whitney test.
Results: The Mann-Whitney test result showed that p-value 0.003 (p-value<0.05) indicating both booklet and video media were effective. The mean score in the video group was greater at 67.23, compared to the mean in the booklet group at 53.77.
Conclusions: Nutritional education using video media is more effective in improving the balanced nutrition knowledge of caregivers of children with ASD compared to booklet.

INTRODUCTION

Someone aged between 6 and 18 years is referred to as a school-age child[1]. At this stage, children acquire new skills at school and their behavior shifts from being self-centered to becoming more objective and empirical[2]. The stages of development in children can vary for each individual, influenced by several factors such as genetics, environment, the maturation of organs and psychological functions, as well as the child's activities[3]. A child's development may sometimes occur rapidly or slowly due to specific factors. ASD is a condition characterized by obstacles in the maturation of neural functions in the brain, which can affect school-age children.

The global prevalence of children with ASD has been steadily rising. According to Zeidan et al. in 2022, approximately 1 in 100 children worldwide are affected by ASD[4]. The Centers for Disease Control and Prevention (CDC) reported that in the United States, the prevalence of ASD was 1 in 150 children in 2002[5]. This figure increased significantly over the years, with 1 in 54 children diagnosed in 2016, followed by 1 in 44 in 2018. The most recent data from 2020 revealed a further rise, showing that 1 in 36 children are now affected by ASD[6].

In Indonesia, a comprehensive national survey on the prevalence of ASD has not yet been conducted. However, data from the Ministry of Education and Culture of the Republic of Indonesia indicate that the number of

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students with ASD enrolled in public and private special schools reached 889 in 2020[7], an increase from 753 students recorded in 2017[8]. This trend highlights the urgent need for greater support and attention from various stakeholders to address the challenges faced by children with ASD and to nurture their unique abilities.

Adequate nutritional intake is essential for optimal growth and development in school-age children, as this age group undergoes rapid physical and cognitive changes. However, children with ASD often face eating disorders and altered eating behaviors, which can significantly impact their nutritional status. Consequently, children with ASD are at a higher risk of malnutrition. Research by Sopiandi (2017) in South Tangerang revealed that 40.6% of children with ASD were obese, 12.5% had excess nutrition, and 9.4% suffered from malnutrition[9]. Similarly, a 2023 study by Aprilia in jabodetabek area reported that 1.8% of children with ASD experienced malnutrition, 6.1% were undernourished, 13.2% had excess nutrition, and 25.4% were obese[10]. Furthermore, a study by Hill et al. (2015) highlighted that children with ASD are less likely to engage in physical activities, increasing their susceptibility to being overweight[11]. Criado et al. (2018) also noted that children with ASD often exhibit picky eating habits, favoring calorie-dense junk foods high in carbohydrates and sodium but lacking essential nutrients[12].

Fulfilling the nutritional needs of children at this age can be challenging. Numerous factors influence nutritional adequacy, including limited family knowledge about nutrition, eating behaviors, the quality of food consumed, socioeconomic status, and environmental conditions[13]. Among these, family knowledge about nutrition plays a pivotal role in fostering healthy behaviors[14]. To effectively fulfil this role, families require accurate and comprehensive knowledge of balanced nutrition. An individual's knowledge is shaped by various determinants, one of which is access to information through mass media[15]. Mass media serves as a powerful tool for disseminating insights on specific topics, enabling the development of new understandings. Nutrition education, when delivered through mass media, can effectively increase public awareness and knowledge. For caregivers of children with ASD, nutrition education serves as a critical step in promoting an understanding of balanced nutrition tailored to their children's unique needs. The success of any educational initiative, however, depends on the use of appropriate and engaging media. Booklets and videos are effective tools for delivering nutrition education, offering accessible, practical, and visually appealing ways to communicate essential information.

Videos offer a distinct advantage over other audiovisual media due to their practical demonstration capabilities. In addition, videos are highly familiar in the modern era, making them a comfortable and accessible tool for many people. On the other hand, booklets also possess unique strengths that set them apart from other written media, particularly in educational contexts. With their organized structure, visual appeal, and ease of use, booklets serve as an effective medium for conveying information. Learning preferences vary among individuals. Some people find it easier to absorb information through visuals, such as videos, while others prefer reading and processing information in a written format, such as booklets.

Video is an effective form of audiovisual educational media because it engages multiple senses during the learning process[16]. Research by Indah and Junaidi (2021) on students in Banda Aceh demonstrated that video media is more effective in increasing awareness about vegetable and fruit consumption compared to poster media. The study found that the average knowledge score after education using video media was 77.4, while poster media resulted in an average score of 68.2[17]. Additionally, research by Dianna et al. (2020) further supports the effectiveness of video media. Using the Mann-Whitney test, the study revealed a p-value=0.019 (p-value<0.05), indicating a statistically significant difference in the effectiveness of education delivered via video media compared to leaflet media[18].

Research by Chandra and Agustina (2021) demonstrated significant findings through the Mann-Whitney test, with a p-value<0.001, indicating a significant difference in the effectiveness of education delivered via video and booklet media. In the study, the average knowledge score for the booklet education group was 36.19, while the video education group achieved an average score of 70.81[19]. These results suggest that video is a more effective educational media for improving knowledge about balanced nutrition compared to booklets. However, the studies did not delve into how video media differs from other formats in addressing the cognitive and emotional needs of respondents. According to Puspikawati (2021), video combines audio and visual elements to convey messages that capture attention more effectively than static text[20]. By engaging the auditory sense, video introduces emotional nuances that are difficult to replicate through text alone. Its dynamic narrative and visualizations provide an emotionally engaging experience for viewers, surpassing the static nature of text or images. Furthermore, video is easier to access and offers greater flexibility compared to written media, making it a highly versatile tool. Overall, video delivers a more immersive experience, enhancing both cognitive understanding and emotional connection to the material. Its ability to integrate compelling visuals with sound allows it to engage audiences on multiple levels, positioning it as a superior educational medium when compared to text-based formats.

In another study, visual media, such as booklets, were found to be effective for educational purposes. Several studies suggest that booklets are more effective as educational media when compared to videos. Research by Handayani and Yulaikah (2019) found a significant difference in the effectiveness of booklet and video media. The group using booklets had a higher average knowledge score, with a difference of 2.5 compared to the video group[21]. This finding is supported by Azahra's research (2022), which showed a Mann-Whitney test result with a p-value=0.005 (p-value<0.05), indicating a statistically significant difference in the effectiveness of booklet and video media. In this study, the average knowledge score was higher for the booklet media group than for the video media group[22].

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Research comparing the educational effectiveness of video media and booklets has been extensively conducted. However, the results remain inconsistent and have yet to be specifically applied to address the nutritional issues faced by children with disabilities, particularly those with ASD. These varying outcomes may be influenced by technological gaps and literacy barriers, which can affect the effectiveness of such media. Access to and the ability to use technology is often limited in low-income families[23]. Additionally, individuals with lower literacy levels tend to be more comfortable with simple written media[24]. Even if technology access is available, it may not necessarily improve knowledge if the content is irrelevant or difficult to understand for individuals with limited literacy skills. This disparity can lead to differences in the effectiveness of visual versus audiovisual media.

Given that previous studies have shown inconsistent outcomes, further research is needed to examine the differences in the effectiveness of video and booklet media in improving balanced nutrition knowledge among caregivers of children with ASD in jabodetabek area. Jabodetabek, an abbreviation for Jakarta-Bogor-Depok-Tangerang-Bekasi, is a metropolitan region surrounding Jakarta. This area was chosen for the study because it includes administrative regions from three provinces, each with a significant population of people with disabilities: West Java, which has the highest number at 21721, DKI Jakarta with 3805, and Banten with 2916[25]. Jabodetabek area faces similar challenges to other major cities in developing countries in terms of accessibility, education, and support for children with disabilities. The aim of this research is to evaluate the difference in effectiveness of booklet and video media education on balanced nutrition knowledge of caregivers for children with ASD in Jabodetabek. A more effective medium is expected to guide the development of focused educational programs. These findings aim to foster improved policies and a better understanding of effective media for promoting inclusive nutrition policies.

METHODS

This study employs a quasi-experimental research design with a two-group pre-test post-test. Quasi-experimental research is used when the researcher cannot randomly assign participants, so participants are selected non-randomly[26]. To minimize bias, consistent measurements were taken using valid and reliable measurement tools. Additionally, the research incorporates bias reduction for the observers, ensuring that assessors are unaware of which group the results belong to. The two-group pre-test post-test design includes a pre-test measurement, followed by intervention, and a post-test for both groups[26]. The population in this study consisted of caregivers of children with ASD aged 6-18 years in jabodetabek area. The research was conducted from January to June 2024 in schools that serve ASD students within jabodetabek area. This research has received approval from UPNVJ Health Research Ethics Committee dated November 11th 2024, under approval number: 176/V/2024/KEPK.

The sample size calculation was performed using the independent sample t-test formula, resulting in a minimum sample size of 120 respondents. This study employed a two-stage cluster sampling technique. Cluster sampling is used to ensure an adequate sample size when the research population is large [27]. The sampling process in this study occurred in two stages. In the first stage, clusters were selected from the population, which was divided into several clusters based on special schools in jabodetabek area. From these clusters, groups were randomly selected using a wheel spin. This random selection continued until the sample size reached the required minimum of 120 respondents. In each selected school, all caregivers were included as part of the sample, meaning every caregiver in each chosen school was included in the analysis. After all selected caregivers were sampled, the next step was to randomly assign them to either the control group or the experimental group using a wheel spin.

In this study, the sample consisted of caregivers of children with ASD aged 6-18 years from jabodetabek area who met the inclusion and exclusion criteria. The inclusion criteria were as follows: guardians, parents, or caregivers who directly manage the child's intake or diet, are willing to complete the informed consent form, agree to participate in the study until its completion, and can cooperate in filling out the questionnaire. The exclusion criteria included respondents who could not participate in the entire study, such as those who left during the study, failed to complete the pre-test or post-test, or withdrew from the intervention. A total of 120 respondents participated in this study.

The research instruments used in this study include: an Informed Consent form, a respondent characteristic questionnaire, a balanced nutrition knowledge questionnaire containing 11 multiple-choice questions related to the Balanced Nutrition Guidelines, which have been tested for validity and reliability, as well as nutrition education media in the form of videos and booklets that cover 10 key messages on balanced nutrition. These media were created by the researcher, based on the Balanced Nutrition Guidelines. Data collection involved gathering respondent characteristics (such as phone number, age, level of education, and occupation of the caregiver) and knowledge scores regarding balanced nutrition, both before and after nutrition education. Data were collected through the completion of questionnaires. Respondents first completed a pre-test on balanced nutrition, which they were asked to fill out within 15 minutes. The study was then proceeded by providing balanced nutrition education using media such as booklets or videos for 15-20 minutes in a single session. After the education session, respondents completed a post-test questionnaire on balanced nutrition, again filling it out within 15 minutes.

This study uses univariate, bivariate, and multivariate analyses. The characteristics of the respondents were analyzed using univariate tests. In the bivariate analysis, a normality test was first conducted to assess the distribution of the data. Since the data was not normally distributed, the difference in mean knowledge scores was analyzed using the Wilcoxon test. Next, a test was performed to compare the differences between the groups. Given that the data was not normally distributed,

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the difference in mean knowledge scores was assessed using the Mann-Whitney test. A significance level of 5% (p-value=0.05) was used for this test, meaning that a p-value<0.05 indicates a statistically significant difference between the two variables. Multivariate analysis was conducted to examine how other factors, such as age, education, occupation, the caregiver's relationship with the child with ASD, and exposure to balanced nutrition information, may influence knowledge acquisition.

RESULTS AND DISCUSSIONS

Based on Table 1, most respondents in the booklet group had higher education (36.67%). In contrast, the majority of respondents in the video group were from high school education (43.33%). Education plays a significant role in influencing knowledge. Generally, individuals with higher levels of education tend to acquire knowledge more effectively[28]. However, having a lower level of education does not necessarily mean an individual will have a limited perspective. When individuals actively seek knowledge, their understanding can be as robust as those with higher education[29].

Based on Table 1, the majority of respondents in the booklet group are housewives (55%). Similarly, most respondents in the video group are also housewives (51.67%). Insights and experience are often gained through one's professional field[30]. For instance, someone working in the healthcare sector is likely to have a better understanding compared to someone in a different field[31].

Table 1 shows that the average age of respondents in both the booklet and video groups is 44 years. In the booklet group, the most common age was 43 years (13.3%), while in the video group, it was 39 years (10%). Age is one of the factors that affect a person's knowledge and cognitive abilities, as understanding generally increases with age[32]. The average age of the companions of children with ASD in this study falls within the productive age range, according to the Indonesia Labor Law Number 13 of 2003, which defines the productive age as being between 15 and 64 years[33].

Table 1. Characteristics of Age, Education, Occupation, Relationship of Caregiver with ASD Child, and Exposure to Balanced Nutrition Information

Characteristic	Booklet Group		Video Group	
	n	%	n	%
Age				
Mean±SD	44.07±7.62		44.17±6.01	
Min-Max	25-63		31-59	
Education				
Primary Education	1	1.67	0	0
Middle School Education	8	13.33	5	8.33
High School Education	17	28.33	26	43.33
Diploma Education	12	20	10	16.67
Higher Education	22	36.67	19	31.67
Occupation				
Civil Servant/Military/Police	2	3.33	2	3.33
Private/ Public Sector Employee	10	16.67	14	23.33
Merchant	4	6.67	2	3.33
Farmer	0	0	1	1.67
Entrepreneur	7	11.67	6	10
Housewife	33	55	31	51.67
Healthcare Worker	1	1.67	0	0
Teacher	0	0	1	1.67
Motorcycle Taxi Driver	0	0	1	1.67
Retired	1	1.67	1	1.67
Household Assistant	2	3.33	1	1.67
Relationship of Caregiver with ASD Child				
Father	10	16.67	13	21.67
Mother	45	75	45	75
Grandmother	3	5	1	1.67
Nanny	2	3.33	1	1.67
Exposure to Balanced Nutrition Information				
Ever	36	60	34	56.67
Never	24	40	26	43.33

n: number of respondents, %: percentage

Based on Table 2, the respondents' level of knowledge about balanced nutrition before the intervention (pre-test) indicates that the majority in the booklet group (65%) fell into the insufficient knowledge category. Similarly, in the video group, most respondents (58.33%) were classified as having insufficient knowledge. After the intervention (post-test), there was a notable improvement in knowledge levels. In the booklet group, the majority of respondents (51.67%) progressed to the good knowledge category. Likewise, in the video group, most respondents (68.33%) also progressed to the good knowledge category following the intervention.

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Table 2. Overview of Balanced Nutrition Knowledge Levels in Pre-test and Post-test

Characteristic	Booklet Group		Video Group	
	n	%	n	%
Balanced Nutrition Knowledge (Pre-test)				
Insufficient	39	65	35	58.33
Adequate	17	28.33	19	31.67
Good	4	6.67	6	10
Balanced Nutrition Knowledge (Post-test)				
Insufficient	4	6.67	0	0
Adequate	25	41.67	19	31.67
Good	31	51.67	41	68.33

n: number of respondents, %: percentage

Table 3. Cross-tabulation of Education Level and Knowledge Level of ASD Child Caregivers

Education Level	Pre-test Knowledge Level						Post-test Knowledge Level					
	Insufficient		Adequate		Good		Insufficient		Adequate		Good	
	n	%	n	%	n	%	n	%	n	%	n	%
Booklet Group												
Parents												
Basic	5	100	0	0	0	0	0	0	3	60	2	40
Intermediate	8	50	6	37.5	2	12.5	0	0	7	43.8	9	56.2
Advanced	22	64.7	10	29.4	2	5.9	3	8.9	14	41.1	17	50
Grandmother												
Basic	2	100	0	0	0	0	0	0	1	50	1	50
Intermediate	1	100	0	0	0	0	0	0	0	0	1	100
Nannies												
Basic	1	50	1	50	0	0	1	50	0	0	1	50
Video Group												
Parents												
Basic	3	75	1	25	0	0	0	0	1	25	3	75
Intermediate	13	52	8	32	4	16	0	0	9	36	16	64
Advanced	18	62.1	9	31	2	6.9	0	0	7	24.1	22	75.9
Grandmother												
Intermediate	0	0	1	100	0	0	0	0	1	100	0	0
Nanny												
Basic	1	100	0	0	0	0	0	0	1	0	0	0

n: number of respondents, %: percentage

Table 3 shows that in the booklet group, all parents of children with ASD who had a basic education level exhibited an insufficient level of knowledge in the pre-test. Among parents with advanced education levels, the majority (64.7%) also fell into the insufficient level of knowledge category in the pre-test. On the other hand, parents with an intermediate education level dominated the good level of knowledge category (56.2%) in the post-test. All grandmothers of children with ASD who had either basic or intermediate education level demonstrated insufficient levels of knowledge during the pre-test. Nannies of children with ASD with a basic education level were evenly split in the pre-test, with 50% having insufficient knowledge and 50% having adequate knowledge. After the post-test, these nannies again showed a balanced distribution, with 50% having insufficient knowledge and 50% achieving a good knowledge level.

In the video group, parents with intermediate and advanced education levels exhibited an insufficient knowledge level in the pre-test. Among parents of children with ASD who had a basic education level, most demonstrated a good knowledge level after the post-test (75%). Parents with intermediate and advanced education levels also showed good knowledge levels after the post-test. The grandmothers of children with ASD in the video group did not experience a change in their knowledge level, maintaining an adequate level after the post-test. Nanny of child with ASD, who had a basic education level, showed an improvement in their knowledge, progressing from insufficient to adequate.

One factor that influences knowledge is education. The results of the cross-tabulation between education level and knowledge level in the booklet group reveal that half of the nannies of children with ASD who have a basic education level still exhibit an insufficient knowledge level, meaning these nannies did not experience an improvement in their knowledge after the post-test. Nevertheless, some parents with advanced education still had an insufficient knowledge level even after the post-test. On the other hand, the grandmother of the ASD child in the booklet group, who had a basic education level, showed an increase in knowledge, moving from an insufficient level at the pre-test to adequate and good levels after the post-test. In contrast, the grandmother of the ASD child in the video group, with an intermediate education level, did not show any improvement in her knowledge. These findings are inconsistent with Marjan's (2018) statement, which suggests that a higher level of education should enhance

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an individual's ability to acquire knowledge[28].

Table 4. The Results of the T-test for Balanced Nutrition Knowledge Before and After Education in ASD Child Caregivers

Balanced Nutrition Knowledge	Mean	Min-Max	p-value
Pre-test Booklet Group	52.3±18.23	18-91	<0.001*
Post-test Booklet Group	78.25±12.86	55-100	
Pre-test Video Group	56.03±17.98	18-91	<0.001*
Post-test Video Group	83.20±10.54	65-100	

*) Wilcoxon Test Statistics Significant at p-value=0.05

Based on Table 4, in the booklet group, the average score before education was 52.3, with a standard deviation of 18.23. The minimum recorded score was 18, and the maximum was 91. This indicates a significant variation in respondents' knowledge levels before the education, with some having insufficient knowledge. After the education, the average score increased to 78.25, and the standard deviation decreased to 12.86. The reduction in standard deviation suggests that the variation in respondents' knowledge levels decreased, indicating that more respondents achieved a more consistent level of knowledge after the intervention. The minimum post-test score was 55, and the maximum was 100, demonstrating that all respondents improved their knowledge following the educational intervention.

In the video group, the average score before education was 56.03, with a standard deviation of 17.98. Similar to the booklet group, the minimum score recorded was 18, and the maximum score was 91. Although the initial average was slightly higher than that of the booklet group, the variation in knowledge was still considerable. After the education, the average score increased to 83.20, with a lower standard deviation of 10.54. The more significant decrease in standard deviation, compared to the booklet group, suggests that the video media led to a more consistent improvement in respondents' knowledge.

Information media play a crucial role in enhancing knowledge about balanced nutrition. This aligns with research by Kamilah and Lestari (2023), which found that nutrition counseling using booklets significantly impacts parents' knowledge of balanced nutrition for children[34]. In this study, the Wilcoxon test was conducted, yielding a p-value<0.001, indicating a significant difference between the pre-test and post-test scores of respondents who received education using booklet media. The findings of this research are consistent with the theory proposed by Jatmika and Maulana (2019), who argued that booklets are effective health education tools. They contain images and text that stimulate the sense of sight, making information easier to convey. Compared to oral media alone, booklets are more realistic, can be used at any time, and are portable[34]. This is also supported by previous research, which showed a significant improvement in mothers' knowledge of balanced nutrition after receiving counseling through a booklet[35]. These findings demonstrate that booklet media is an effective tool for enhancing knowledge.

Bivariate analysis presented in Table 4 was conducted using the Wilcoxon test, which yielded a p-value<0.001, indicating a significant difference between the pre-test and post-test scores of respondents who received education through video media. This result aligns with the research by Alkariema (2023), which found that video-based education can enhance mothers' knowledge of balanced nutrition[36]. Audio-visual media, such as videos, combine both sound and moving images. Video has several advantages, including the ability to present messages in an engaging way, being unrestricted by time or distance, and offering the flexibility to be played at any time[16]. These findings are consistent with the research by Syarifah et al. (2023), which reported a significant improvement in the knowledge of mothers with stunted toddlers regarding balanced nutrition through the use of video media[37].

Table 5. Comparison of the Effectiveness of Balanced Nutrition Education Using Booklet and Video Media

Variable	Group	Mean Rank	p-value
Balanced Nutrition Knowledge Before Education	Booklet	57.06	0.272
	Video	63.94	
Balanced Nutrition Knowledge Before Education	Booklet	53.77	0.030*
	Video	67.23	

*) Mann-Whitney Test Statistics Significant at p-value=0.05

The analysis to assess the difference in average balanced nutrition knowledge before education between the booklet and video groups was conducted using the Mann-Whitney test. As shown in Table 5, the p-value for the balanced nutrition knowledge variable was 0.03 (p-value<0.05), indicating a significant difference in the knowledge of caregivers of children with ASD after receiving education through booklets and videos. The mean rank for the booklet group was 53.77, while the mean rank for the video group was 67.23. The difference in mean ranks between the booklet and video groups was -13.46, with the video group having the higher mean rank. This suggests that education using video media is more effective than booklet-based education. Video media offers greater potential for enhancing knowledge compared to booklets.

Visual elements such as moving images, graphics, and animations in videos can simplify the explanation of complex concepts, making them easier to understand compared to booklets. Videos also capture respondents' attention, increasing their engagement in the learning process. Additionally, videos allow for the direct

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demonstration of information. For instance, balanced nutrition messages, including examples of appropriate meal portions, can be visually demonstrated, helping caregivers better understand and retain the information. Furthermore, many people today are accustomed to consuming content in video format, whether through social media platforms or learning applications. This familiarity makes them more comfortable with, and receptive to, the material presented in videos.

The results of the Mann-Whitney test in this study differ from those of Syarifah et al. (2023), which found no significant difference in knowledge after education using booklet and video media[37]. In their study, both video and booklet media were equally effective in enhancing knowledge[37]. However, the findings of this study are consistent with the research by Chandra and Agustina (2021), which identified a significant difference in knowledge scores after education using booklet and video media, with the video media group showing higher mean ranks. Therefore, it can be concluded that video media has a greater impact on increasing knowledge related to balanced nutrition[19].

Knowledge is the result of sensory interaction with specific phenomena. Generally, knowledge is acquired through sight and hearing, utilizing the eyes and ears. When providing education through video media, both sight and hearing are engaged, with information presented through images and sound[38]. The clarity with which information is received depends on the number of senses involved[15]. Stimulating both auditory and visual senses helps individuals process and retain information more effectively[39].

This is consistent with the Cone of Experience theory, popularized by Edgar Dale. According to Dale, the learning process emphasizes the active role of an individual in interacting with their learning environment through all five senses[40]. The more concrete the learning media, the greater the learning experience[40]. Conversely, the more abstract the learning process, the fewer experiences individuals will gain. Learning through both sight and hearing is considered more concrete compared to learning through reading or relying solely on the sense of sight.

Setting aside the role of booklets and videos as mass media, knowledge can also be influenced by education and occupation[15]. Individuals with lower levels of education are more likely to face unemployment, which can lead to inadequate income and limited experience. This, in turn, impacts their mindset and ability to meet their needs[41]. Research by Sutrisno and Tamim (2023) states that parents with higher education levels are more likely to acquire and understand insights more easily than those with lower education levels[42].

According to the researchers' analysis, individuals with lower levels of education do not necessarily have a lower capacity to acquire knowledge. When individuals are motivated and diligent in seeking knowledge, their understanding can be just as strong as that of those with higher education[29]. In the context of this study, the relationship between caregivers and children with ASD also plays a key role in motivating caregivers to actively pursue knowledge. Parents are instinctively driven to ensure their child's safety and instill moral values that help prepare the child to lead a healthy and productive life[43]. They also hold the primary responsibility and authority to regulate and control their children's lives[44]. This strong sense of responsibility can motivate parents of children with ASD to actively seek knowledge. Therefore, regardless of education level, it is important to provide nutrition education to the community in order to impart valuable insights and understanding about health.

Bivariate selection in multivariate analysis is the first step in the variable selection process. This step is carried out to assess the relationship between each potential confounding variable and the dependent variable individually before determining which variables will be included in the multivariate analysis model. Variables with a p-value<0.25 are considered suitable for use in multiple linear regression tests. However, confounding variables such as age, education, occupation, relationship of caregiver with ASD, and exposure to balanced nutrition information did not meet the criteria for inclusion in the multivariate analysis. As a result, the multivariate analysis could not proceed, as there were no significant confounding variables to include in the model. The p-values for these confounding variables are shown in Table 6.

Table 6. Bivariate Selection for Multiple Linear Regression Test

Variable	Booklet Group		Video Group	
	p-value	Meets Criteria*	p-value	Meets Criteria *
Age (Years)	0.944[a]	No	0.584[a]	No
Education	0.263[b]	No	0.824[b]	No
Occupation	0.289[b]	No	0.658[b]	No
Relationship of Caregiver with ASD Child	0.540[b]	No	0.096[b]	No
Exposure to Balanced Nutrition Information	0.082[c]	No	0.082[c]	No

a: Spearman Correlation Test, b: Kruskal-Wallis Test, c: Mann-Whitney Test, *) Criteria: p-value<0.25

The combination of visual and audio elements in videos helps explain complex concepts in a way that is easier to understand compared to booklets. Furthermore, many people today are already accustomed to consuming content in video form, whether through social media platforms or learning applications. This familiarity can make them more comfortable and responsive to material presented in video format. However, the limitations of this study include the small sample size and the limited duration of the intervention.

CONCLUSIONS

The research findings reveal significant differences in the knowledge of balanced nutrition among caregivers of children with ASD before and after receiving education through either booklets or videos.

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The results also show that education using video media is more effective than using booklets in enhancing caregivers' knowledge of balanced nutrition. Future research should consider expanding the study by including variables such as attitudes and behaviors, or by exploring the use of other types of media. Additionally, confounding variables, such as literacy levels and access to technology (particularly video media), should be incorporated into future studies.

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CONFLICT OF INTEREST AND FUNDING DISCLOSURE

The authors declare that there are no conflicts of interest related to this article. The research was independently funded by the researchers.

AUTHOR CONTRIBUTIONS

TKP: conceptualization, investigation, methodology, original draft writing, editing; SFS: supervision, review and editing of the manuscript; HRPS: supervision, review and editing of the manuscript; NS: supervision, review and editing of the manuscript.

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