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ANIMAL AND VEGETABLE PROTEIN INTAKE AMONG PRESCHOOL CHILDREN: A CROSS-SECTIONAL STUDY

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ABSTRACT

Protein is macronutrients needed in child growth, which can be obtained from animal and plant foodstuffs. Protein intake gets more attention because energy-protein malnutrition is more common in children under five. Protein nutrition for children must be fulfilled to prevent growth retardation in the next phase. This research aims to establish a profile of preschool children's animal and vegetable protein intake. This type of research is descriptive observational with a cross-sectional. This research was conducted at Bina Anasprasa Nuris Jember Kindergarten. The sample in this study was preschool children aged 3-5 years, totaling 53 people who were taken by purposive sampling. Food consumption data for children was obtained using the 1x24-hour food recall method. Processing and analysis of data using univariate analysis. Preschool girls have more than boys (67.9% and 32.1%). The majority of mothers are not working/housewives (62.3%), while the majority of fathers are self-employed (45.3%). Most families have income above Jember Regency Minimum Wage in 2023 (62.3%). Nutritional status with indicators of weight/age, height/age, weight/height of all preschool children has normal, normal, and good nutritional status (100%). Total protein intake increased slightly for boys and families whose income was above the minimum wage. Meanwhile, the intake of vegetable and animal protein sources in preschool children is similar but slightly higher in vegetable protein. Animal protein food ingredients still have high biological value because they contain all essential amino acids compared to vegetable protein. Therefore, preschoolers need to increase their consumption of animal protein food ingredients in their daily diet.

Keywords:
Animal protein, Preschool children, Vegetable protein.

BACKGROUND

Protein is a macronutrient source that contributes 10-15% of total energy and is an essential element in the diet because it is composed of amino acids (Lin et al., 2011; Have et al., 2020). Protein also plays an essential role in the growth and repair of cells in the body and serves as a source of essential amino acids, which are very important in metabolism (Lin et al., 2011; Ernawati, 2016). The body cannot synthesize nine essential amino acids, and must be obtained from food: histidine, isoleucine, leucine, lysine, methionine, phenylalanine, and threonine, tryptophan, and valine (Have et al., 2020). Adequate pro-

tein intake is the basis for the growth and development of children from infants, toddlers to adolescents because, at that stage, it is marked by an increase in height, weight, development, and rapid maturation of functions (Koletzko et al., 2016; Have et al., 2020).

Protein sources can be obtained from animal and plant foods. According to a study by Madrigal et al. (2021), children under ten years in Spain showed that their protein intake exceeded the European Food Safety Authority (EFSA) recommended. Milk and dairy product intake was the highest contributor to total protein intake, followed by meat and meat products, cereals, fish and shellfish, eggs, and nuts. They consume more protein of animal origin (milk and dairy products, meat and its products, fish and shellfish) than protein of plant origin (cereals, nuts, vegetables, and fruit). Meanwhile, in Indonesia, based on the 2014 Survei Konsumsi Makanan Individu (SKMI), the average protein adequacy level in Indonesia has exceeded what has been recommended, reaching 105.3 percent. The highest adequacy level is in the children under five group. However, the protein adequacy of the Indonesian people is still dominated by types of vegetable protein, such as legumes and cereals, with an average consumption of 56.7 grams and 257.7 grams per day (Badan Penelitian dan Pengembangan Indonesia, 2014). In comparison, animal protein is only 42.8 grams per day, even though protein sourced from animals has a high biological value than vegetable protein (Damayanti, 2017).

Parental involvement plays a vital role in promoting eating habits in early childhood. Socioeconomic status, such as income, education level, and type of work, play an essential role in food intake because it affects children's food preferences and food quality choices (Lin et al., 2011). In developing countries, protein intake receives more special attention because energy-protein malnutrition is more common than in developed countries. Malnutrition can majorly affect pregnant women and children under five (Muller & Krawinkel, 2005; Lin et al., 2011). The impact caused by the problem of malnutrition in preschool children can also threaten the quality of human resources.

Until now, Nurhasanah et al. 2021's latest study assessed total protein in children under two years old in the Jember region (Nurhasanah et al., 2021). However, there still needs to be data to assess animal and vegetable protein intake in preschool children in the Jember region. Even though the fulfillment of nutrition, especially in preschool children, must be fulfilled to prevent growth retardation in the next phase. This research aims to establish a profile of preschool children's animal and vegetable protein intake.

METHODS

This type of study is descriptive observational with a crossectional design. This research was conducted at Bina Anasprasa Nuris Kindergarten Jember in March 2023. The sample in this study was preschool children aged 3-5 years who attended school at the research location. Parents/guardians were willing to be included in the study by signing informed consent. Samples suffering from chronic diseases such as medically declared Pulmonary Tuberculosis, cancer, heart, and kidney are excluded. Samples totaling 53 children were taken by purposive sampling.

The data collected includes sample identity, gender, parental characteristics, mother and father employment status, and family income. At the same time, nutritional status data is obtained through anthropometric measurements. Data on children's food consumption is obtained by the 1x24-hour food recall method with a food recall sheet filled in by the child's parents. Then, food consumption data were analyzed for nutrients using nutrisurvey software. Meanwhile, disease data is obtained through the Kartu Menuju Sehat (KMS) owned by the child and assisted by the child's mother's interview using a questionnaire.

Data from anthropometric measurements, including height and weight, were obtained using a microtoice tool with an accuracy of 0.1 cm and a digital weighing scale with an accuracy of 0.1 kg. The data obtained were compared with the 2020 Regulation of the Minister of Health of Indonesia's standard with the Weight/Age, Height/Age, and Weight/Height index. Processing and data analysis using univariate analysis by entering the data obtained in the distribution and frequency tables

RESULTS

Table 1 is a table of characteristics of preschool children and their families which shows that the number of female preschoolers is higher than that of males (67.9% and 32.1%). Based on occupation, most mothers were not working/housewives (62.3%), while most fathers were self-employed (45.3%). Judging from the amount of family income, most families have an income above Jember Regency Minimum Wage in 2023 which is above IDR 2,555,662.91 (62.3%). Based on the nutritional status with the indicators Weight/Age, Height/Age, and Weight/Height, all preschool children have normal, normal, and good nutritional status (100%).

Table 2 shows median values according to gender and family income. The table shows that the

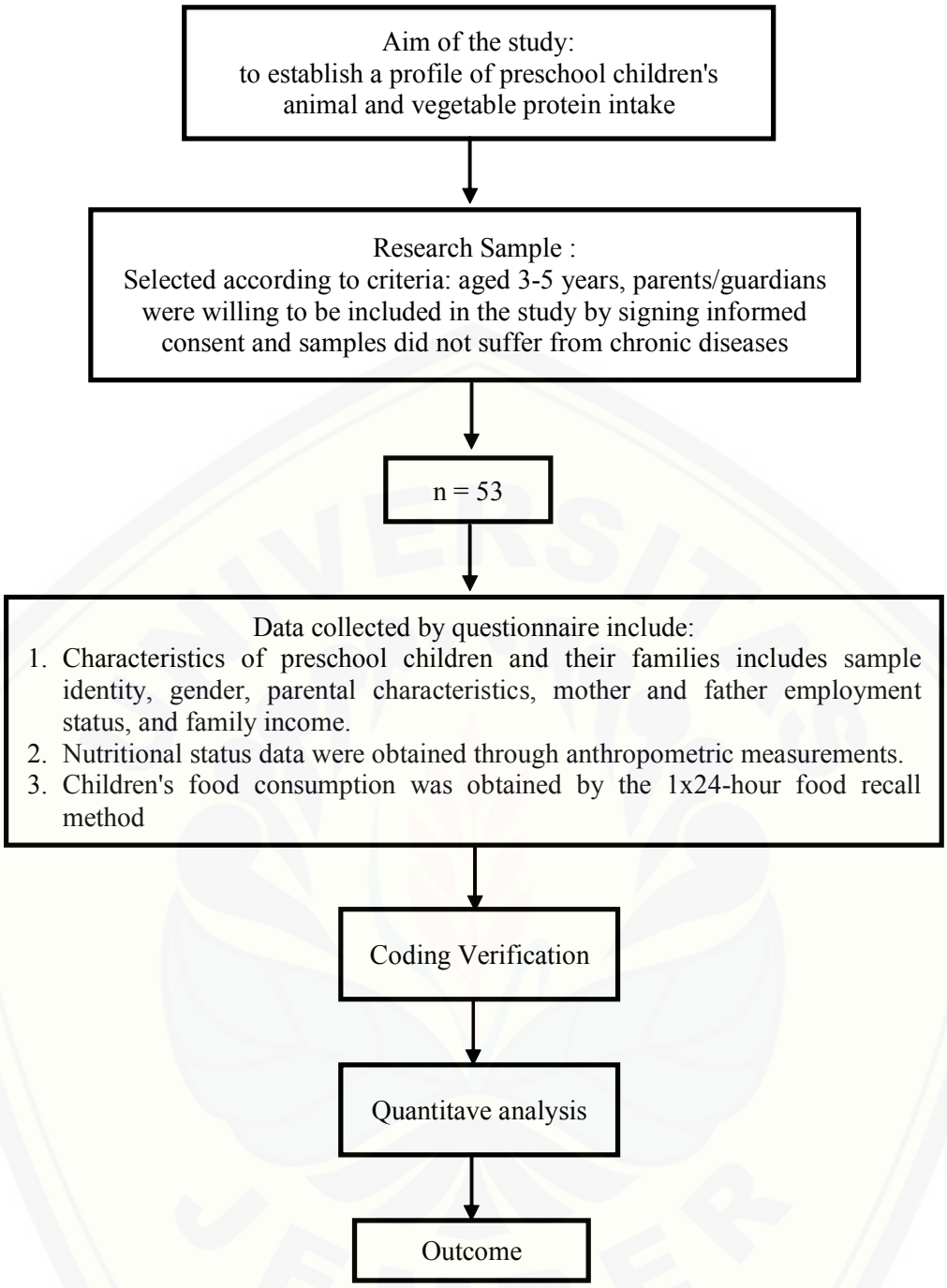

Fig.1. Methodology used in the study

protein intake of preschoolers for boys and girls is not much different when viewed from the intake of animal and vegetable protein. However, for the total protein intake, the total protein intake increases slightly in the male sex. Based on family income, total protein, animal, and vegetable protein is higher in families with more than the Jember Regency Minimum Wage than those less than Jember Regency Minimum Wage.

Table 3 shows the diversity of food sources of protein in preschoolers. The source of protein preschool children consumes consists of 8 types: cereals, nuts, vegetables, fruits, meat/chicken, fish, eggs and milk and milk product. The intake of vegetable and animal protein sources in preschool children is similar but slightly higher in vegetable protein (cereal).

DISCUSSION

In general, the subjects in this study are in the middle socioeconomic environment regarding family

Table 1. Characteristics of Preschool children and Families

Age of child	f	%
Child gender		
Female	36	67,9
Male	17	32,1
Mother's work		
Housewives	33	62,3
Self employed	5	9,4
Private Employees	6	11,3
Government Officer	2	3,8
Other	7	13,2
Father's work		
Self employeio'jd	24	45,3
Private Employees	16	30,2
Government Officer	3	5,7
Other	10	18,9
Family income		
< Jember Regency Minimum Wage	19	37,7
≥ Jember Regency Minimum Wage	34	62,3
Nutritional Status Indicator Weight/Age		
Normal value	53	100
Nutritional Status Indicator Height/Age		
Normal value	53	100
Nutritional Status Indicators Weight/Height		
Normal Nutrition	53	100

Table 2. Median Protein Value by Sex and Family Income

Child	Protein Intake (g)		
	Total	Vegetable	Animal
Female	41,8	17,44	21,68
Male	42,4	16,39	22,48
< Jember Regency Minimum Wage	40,5	17,4	20,56
≥ Jember Regency Minimum Wage	42,2	16,4	21,74

Table 3. Diversity of Types of Food Sources of Protein

Food groups	Median	Min	Maks
Cereal	9,42	5,58	21,33
Fish	9,36	0,01	35,64
Egg	6,2	0,01	18,8
Meat/chicken	4,42	0,01	39,89
Vegetable	1,79	0,01	9,51
Nuts	1,6	0,01	15,78
Milk and milk products	1,48	0,02	16,06
Fruits	0,05	0,01	2,20

income. Most family income is above Jember Regency Minimum Wage in 2023, IDR 2,555,662.91, while 37.7% is below Jember Regency Minimum Wage. Research from Wirawan and Rahmawati (2016) shows a relationship between family income and the nutritional status of toddlers, where parental

income can affect children's access to nutritious food to affect their nutritional status. The role of working mothers can also affect parenting because non-working mothers can provide the best parenting style for children to achieve optimal nutritional status (Priawantiputri & Aminah, 2020). In this study, most mothers did not work, and 37.7% of mothers worked, so it is expected that working and non-working mothers can provide good parenting for children to fulfill nutritional needs. Based on nutritional status with indicators of weight/age, height/age, and weight/height showing 100% of preschool children in normal conditions, namely children who do not experience nutritional problems, this study is similar to the results of research from Rohimah et al. (2015) which shows that preschool age children in South Tangerang City with high family income have good nutritional status.

Protein intake of male and female preschool children collected through the food recall method showed similar results when viewed from total protein, vegetable, and animal protein. According to Regulation of the Minister of Health of the Republic of Indonesia Number 28 of 2019 Daily Protein Adequacy Rate (RDA) in children aged 1 to 3 years 20 g, 4 to 6 years 25 g, then the total protein intake in preschool children in this study can reach more than 100 percent. However, the difference is the composition of animal and vegetable protein source foodstuffs, animal protein source foods contribute more protein intake than plant foods. The results of this study are in line with research by Ernawati et al. (2016), which showed that there was no significant difference between total animal and vegetable protein intake in boys and girls, and in line with research by Ningsih et al. (2018) which concludes that the value of total protein is the same in school boys and girls.

Protein is one of the macronutrients preschool children need to grow and develop optimally. The results of research from Fikawati et al. (2021) on preschool children in Central Jakarta show that preschool children whose protein intake is less than recommended have the potential to be four times more stunted than children whose intake is sufficient. Another study also showed 873 Ethiopian children who experienced a lack of protein quantity and quality intake were associated with stunting (Tessema et al., 2018). Stunting is related to protein intake that stimulates insulin in IGF-1 (Millward, 2017; Dror & Allen, 2011).

Protein intake provides the amino acids needed by the body to build bone matrix and influence bone growth because protein serves to modify the secretion and osteotropic action of IGF-I. Thus, protein intake can modulate the genetic potential of achieving peak bone mass. IGF-I affects bone growth by stimulating chondrocyte proliferation and differentiation in the growth epiphyseal plate and directly affecting osteoblasts. In addition, IGF-I increases the renal conversion of 25 hydroxy-vitamin D3 to increase the absorption of calcium and phosphorus in the intestine. Low protein intake has been shown to impair bone mass mineral acquisition by impairing IGF-I production and its effects (Sari et al., 2016).

In this study, preschool children with families with incomes above standard received higher protein intake than those below standard. Protein intake can increase as family income increases. The results of this study are similar to Lin et al. (2011) study of 661 Flemish preschoolers in Belgium, which showed that Flemish children from high-income families get better quality and quantity protein intake than low-income families. Differences in amino acid content also determine the choice of a good quality protein source. Families with high incomes can buy high-quality food sources, such as meat and fish, compared to families with incomes below standard, who buy more food sources of vegetable protein.

In this study, vegetable protein sources and animal protein have values not much different, but the food source of protein most consumed by preschoolers is the type of vegetable protein. This result is similar to a study of children in Bogor, which showed that they consumed more vegetables than animal protein (Trisasmita et al., 2020). Food sources of protein from animals such as meat, chicken, fish, eggs, and milk contain relatively higher levels of protein (more than 40% dry matter) than vegetable protein (except nuts), with protein levels of less than 15% dry matter (Sari et.al, 2016).

The human body can synthesize non-essential amino acids, but essential amino acids cannot be synthesized by the body (Sjarif et al., 2019). Foods with animal protein sources have complete essential amino acids in sufficient quantities for the body's needs (Wu et al., 2014). Essential amino acids are amino acids that cannot be formed by the body and can only be obtained from foodstuffs, amino acids needed by preschoolers are lysine, leucine, isoleucine, valine, threonine, phenylalanine, tyrosine, methionine, cystine, tryptophan, histidine and arginine (Soekirman, 2000). Meanwhile, vegetable protein is an incomplete or low-quality protein that does not contain all types of essential amino acids needed in the growth process (Damayanti, 2017)

The results of research by Wu et al., 2014 that growth disorders can occur when one or more amino

acids are not given, so if they want to achieve optimal growth, then children need protein intake in reasonable quantity and quality, namely protein containing complete essential amino acids needed for the synthesis of new cells or tissues for growth and replacing damaged tissue apart from being a source of protein. Animal foods also contain various micronutrients that are important for the growth of preschool children such as vitamins A, B12, C and D as well as minerals such as calcium and zinc that are easily absorbed by the body (Ernawati, 2016).

Based on the results of this study, preschoolers do not regularly consume milk. milk is one source of animal protein that is important in preventing stunting. According to Sjarif et al. (2019), the protein content of milk has superior characteristics in supporting growth when compared to other animal proteins (meat, eggs, poultry), such as arginine, lysine, methionine, and cysteine. One liter of milk contains 32-35 grams of protein, calcium, phosphorus, energy, vitamins, casein, and whey. So, parents need to encourage and facilitate their children to consume milk regularly.

CONCLUSION

Protein is a macronutrient that is very important for the growth of children under five, composed of essential and non-essential amino acids. Essential amino acids are amino acids that cannot be formed by the body and can only be obtained from food. The protein intake of preschoolers for boys and girls is similar when viewed from animal and vegetable protein intake. The intake of vegetable and animal protein sources in preschool children is similar but slightly higher in vegetable protein (cereal), and preschoolers do not regularly consume milk. Foodstuffs based on animal protein have a complete and higher quality amino acid content needed in growing children. So, parents need to facilitate and encourage children to get animal protein foodstuffs.

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