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Implementation of child nutrition anthropometry pocketbook for early childhood education to increase the ability of teachers to assess nutritional status of early childhood education students in Gianyar Regency, Bali, Indonesia

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ABSTRACT

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Introduction: The age of preschool children is the golden age where the physical and psychological is rapidly developing then it is necessary to fulfil the nutritional needs. This is a period that is vulnerable to under-nutrition and over-nutrition. To deal with these problems, nutritional monitoring status must be carried out jointly between teachers, parents, and health care workers. Most early childhood education teachers have not assessed children's nutritional status and only weighed them. Based on these problems, the early childhood education Anthropometry Pocket Book was made to assist teachers in determining the nutritional status of children.

Method: The study used a different subject design and was carried out in April-October 2021 involving 52 samples, divided into two groups, namely the Control Group with 26 people and the Treatment Group with 26 people. The data collected such as sample identity and data on the ability of teachers to assess nutritional status using the BW/Age, Height/Age, BW/H, and BMI/A indexes before and after the intervention in the Control and Treatment Group. The data were analyzed descriptively by looking for the mean, standard deviation, and different tests were carried out to determine the difference in the effect of treatment on the control group and the treatment group, statistical tests Independent samples t-test at significance level (0.05) used on homogeneous data and Mann Whitney test on inhomogeneous data.

Result: The results showed that the average ability of teachers to assess children's nutritional status in the Treatment Group was higher than the Control Group after being given the intervention. The enhancement before and after intervention in the control group with body weight/age (BW/A) index was 69.1%, height/ age (H/A) was 67.0%, BW/A was 71.5%, and body mass index/age (BMI/A) was 95.4%. While the increase in the Treatment Group with index BW/A 235.9%, H/A 220.5%, body weight/height (BW/H) 225.8%, and BMI/A 141.5%.

Conclusion: Statistical analysis Independent samples t-test at the significance level α=0.05 showed that there was a significant difference (p<0.05) in the teacher's ability to assess the nutritional status of children with the index BW/A, H/A, BW/H, and BMI/A in the control group with treatment after intervention. The teachers of early childhood education are always expected to make it a habit to monitor children's nutritional status using a pocketbook on child nutrition anthropometry that has been applied.

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INTRODUCTION

Physical and psychological development rapidly increased during preschool age and that is the reason to fulfill the nutritional needs.[1] At this period, children are vulnerable to under-nutrition or over-nutrition. The state of malnutrition/poor nutrition in children under five years old can hamper the development of children, with negative impacts that will take place in the future life such as intellectual decline, vulnerability to disease, decreased productivity that causes poverty, and the risk of giving birth to babies with low birth weight.[2] Every parent certainly wants a balance between physical growth and optimal mental development in their children. Moreover, in the next 10-30 years, children will face more severe challenges so that they must be physically and mentally healthy to achieve success in the future.[2]

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results from 2007 to 2013 showed an alarming fact that underweight in Indonesia increased from 18.4% to 19.6%, stunting also increased from 36.8% to 37.2%. The trend of nutritional problems in Bali in 2015-2017 showed: 1) cases of malnutrition/lack of malnutrition experienced a very small decline, namely 9.0% (2015) to 8.6% (2017); 2) thin/wasted cases increased by 5.9% (2015) to 6.3% (2017); 3) short/stunting cases experienced a very small decrease, namely 20.7% (2015) to 19.0% (2017).[3] The results of the 2018 Indonesian Basic Health Research for stunting in Bali Province in 2018 were 21.8% with the distribution of Gianyar Regency 12.1%, Tabanan 16.2%, Buleleng 20.5%, Klungkung 21.4%, Badung 25.2%, Karangasem 26.2%, Jembrana 29.1%, Bangli 43.2%, and Denpasar City 18.8%. The incidence of stunting in Indonesia showed a decrease from 37.2% in 2013 to 30.8%.[4]

The nutritional status of preschool-age children is crucial so teachers and parents must know that. The growth and development of preschool children need to be considered because the malnutrition during this golden period is irreversible (can not be repaired).[5] The first thousand days of a child's life is a critical period that determines their future, and during that period Indonesian children face serious growth disorders. To overcome the incidence of stunting, lack of nutrition, and malnutrition, people directly involved in child care in the community, namely early childhood education teachers and parents, need to be educated to understand the importance of nutrition for under five-year-old children.

The government has issued a policy through the Regulation of the Minister of Health Number 66 of 2014 concerning the Monitoring of Child Growth, Development, and Developmental Disorders. The regulation states that monitoring children's growth, development, and developmental disorders is directed at improving children's health and nutritional status, cognitive, mental, and psychosocial. Monitoring is carried out in primary health care facilities and kindergartens organized by Kindergarten teachers in collaboration with students' parents and health workers.[6]

Quality of early childhood education as an institution that can play a role in solving children's nutritional problems. Indonesian Government Regulation No. 60 of 2013 concerning Integrative Holistic Early Childhood Development explains that Integrative Holistic Early Childhood Development is an early childhood development effort carried out to meet the diverse and interrelated essential needs of children in a stimulating, systematic, and integrated manner. The holistic stimulation services include education, health, nutrition, care, nurturing, protection, and welfare services.[7] Paying attention to this, early childhood education or kindergarten's teacher must have knowledge of nutrition and health as well as the ability and expertise to monitor children's development by weighing children's weight and measuring children's height regularly, then interpreting the data from those measurements so that they can determine the nutritional status of children.

Preliminary studies have been conducted in several early childhood education in Gianyar Regency and Denpasar City found that early childhood education teachers had measured the height and weight of their students, but no one has interpreted nutritional status to determine the growth of children. After conducting limited interviews with kindergarten teachers, they did not evaluate nutritional status because they did not know the right references or books about children's growth evaluation.[4]

The Child Nutrition Anthropometry Pocket Book for early childhood education translated from the Regulation of the Minister of Health of the Republic of Indonesia Number 2 in 2020 concerning Child Anthropometry Standards has been created to overcome these problems. It has been tested on several early childhood education's teachers in Denpasar City. As a result, the Child Nutrition Anthropometry Pocket Book for early childhood education can be used easily to determine the nutritional status of children so that it is widely applied in several early childhood education in Gianyar Regency, Bali Province. After implementing this pocketbook, it is hoped that early childhood education teachers will be able to assess the nutritional status of children easily and detect early if there are nutritional problems in children.

This study aimed to improve teachers' ability to determine the nutritional status of children by implementing the anthropometry of early childhood nutrition anthropometry pocketbook in Gianyar Regency, Bali, Indonesia.

MATERIAL AND METHODS

This study uses a cross sectional design with different subject design which was carried out in April-October 2021.[8] The target population in this study was early childhood education teachers in Gianyar Regency, then the affordable population was early childhood education teachers in Payangan District. The affordable population that met the inclusion criteria was determined as a simple random sampling by a lottery method so that sample for Control and Treatment Group was 26 people in each group. The data collected included sample identity and data on the ability of teachers to assess nutritional status using the bodyweight/age (BW/A), height/age (H/A), bodyweight/age (BW/H), and body mass index/age (BMI/A) indexes before and after the intervention in the control and treatment group. The intervention in the control group used a conventional model, namely the standard table of nutritional status based on WHO-NCHS criteria, and in the treatment group using the child nutrition anthropometry pocketbook. The data were analyzed descriptively by looking for the mean and standard deviation and a different test was carried out to determine the difference in the effect of treatment on the control group and the treatment group, using a statistical test Independent samples t-test at a significance level of α=0.05 on homogeneous data and the Man Whitney test on the data, which is not homogeneous.

RESULTS

Sample Characteristics
The characteristics of the sample based on age and teaching experience in kindergarten are fully described in **Figure 1**.

Figure 1 showed that the average age of the sample in the Control and Treatment Group is still in the productive age, namely 39.7 years in the Control Group and 47.3 years in the Treatment Group, with the minimum and maximum ages that are not much different. The sample work experience got almost the same average, namely 10.2 years in the Control Group and 12.2 years in the Treatment Group.

The ability of the sample to assess nutritional status

The ability of the sample to assess the nutritional status of children in this study was taken from several indicators, namely BW/A, H/A, BW/H, and BMI/A. Descriptive analysis which includes the mean and standard deviation, as well as analysis of the different tests using Independent samples t-test at significance level α=0.05 (because all data were homogeneous) data on the ability of the sample to assess nutritional status was then described in each index.

Index body weight/age

Descriptive analysis and different test data on the ability of the sample to assess nutritional status based on the BW/A index as shown in Table 1.

Table 1 showed the average ability of the sample to assess nutritional status with the BW/A index before and after the intervention in the control and treatment groups, each of which increased by 69.1% in the control group and 235.9% in the treatment group. The independent-sample t-test analysis of the pre-data in the control and treatment groups found that there was no significant difference (p>0.05), indicating that the initial conditions in the two groups were the same, while the post-data analysis and the analysis of increasing scores (pre-post) in the control and treatment groups, there was a significant difference (p<0.05).

Index height per age

Descriptive analysis and different test data on the ability of the sample to assess

nutritional status based on the H/A index as shown in Table 2.

Table 2, showed the average ability of the sample to assess nutritional status with the H/A index before and after the intervention in the Control and Treatment Group, each increased by 67.0% in the Control Group and 220.5% in the Treatment Group. The independent-sample-t-test analysis of pre-data in the control and treatment groups found no significant difference (p>0.05), indicating that the initial conditions in the control and treatment groups were the same. Analysis of post data and analysis of increasing scores (pre-post) in the control and treatment groups found that there was a significant difference (p<0.05).

Index body weight per height

Descriptive analysis and different test data on the ability of the sample to assess nutritional status based on the BW/H index as shown in Table 3.

Table 3 showed the average ability of the sample to assess nutritional status with an index of BW/H before and after the intervention in the Control and Treatment Group, each of which increased by 71.5% in the Control Group and 225.8% in the Treatment Group. The independent-sample-t-test analysis of pre-data in the control and treatment groups found no significant difference (p>0.05), indicating that the initial conditions in the control and treatment groups were the same. Analysis of post data and analysis of increasing scores (pre-post) in the control and treatment groups found that there was a significant difference (p<0.05).

Index body mass index per age

Descriptive analysis and different test data on the ability of the sample to assess nutritional status based on the BMI/A index as shown in Table 4.

Table 4 showed the average ability of the sample to assess nutritional status with BMI/A index before and after the intervention in the Control and Treatment Group, each increased by 95.4% in the Control Group and 141.5% in the Treatment Group. The independent-sample-t-test analysis of pre-data in the control and treatment groups found that there was no significant difference
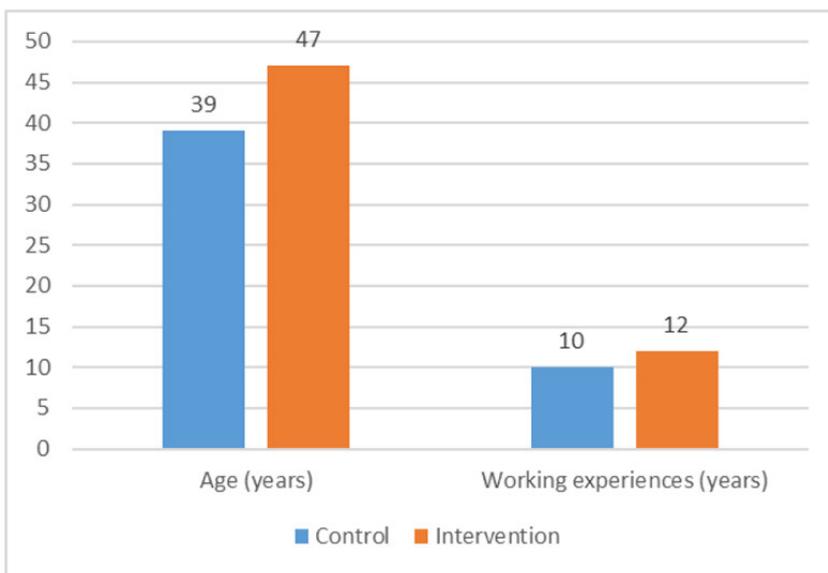

Figure 1. Sample Characteristics by age and work experience

Table 1. Descriptive analysis and data difference test ability of samples to assess nutritional status with BW/A index before and after intervention in control and treatment groups

Index BW/A	Control Group	Treatment Group	t	p
Pre	26.9±12.5	23.1±9.5	1.246	0.219
Post	45.5±20.8	77.6±16.3	-6.177	0.001
Enhancement	18.6±23.3	54.5±19.2	-6.072	0.001

Table 2. Descriptive Analysis and Data Difference Test Ability of Samples to Assess Nutritional Status with H/A Index Before and After Intervention in Control and Treatment Groups

Index H/A	Control Group	Treatment Group	t	p
Pre	28.8±12.9	24.4±10.8	1.357	0.181
Post	48.1±20.0	78.2±13.9	-6.290	0.001
Enhancement	19.3±23.5	53.8±17.8	-5.976	0.001

Table 3. Descriptive analysis and data difference test ability of samples to assess nutritional status with BW/H index before and after intervention in control and treatment groups

Index BW/H	Control Group	Treatment Group	t	p
Pre	29.5±12.7	24.4±9.7	1.633	0.109
Post	50.6±22.4	79.5±12.7	-5.717	0.001
Enhancement	21.1±14.8	55.1±11.7	-6.187	0.001

Table 4. Descriptive analysis and differential test of sample ability to assess nutritional status with BMI/A index before and after intervention in control and treatment groups

Index BMI/A	Control Group	Treatment Group	t	p
Pre	34.6±8.7	36.8±7.5	-0.993	0.325
Post	67.6±11.1	89.1±8.1	-7.955	0.001
Enhancement	33.0±14.8	52.3±14.9	-3.256	0.002

(p>0.05), indicating that the initial conditions in the control and treatment groups were the same. Analysis of post data and analysis of increasing scores (pre-post) in the control and treatment groups found that there was a significant difference (p<0.05).

DISCUSSION

The mean age of the sample in this study was 39.7±10.9 years in the control group and 47.3±9.0 years in the treatment group. According to The Law No. 13 of 2003 concerning Manpower, it is stated that a child is every person under the age of 18 (eighteen) years, while according to The Law No. 13 of 1998, it is stated that the elderly are people who are aged 60 years and over, so the age of the sample in This research can be said as productive age in which the foundation of the age group of children and the elderly.[9,10] Referring also to Government Regulation Number 45 of 2015 Article 15 concerning the Implementation of the Pension Guarantee Program, it is stated that the retirement age as referred to in paragraph (1) from 56 years to 57 years.[11]

Data collection on work experience showed that the average sample work experience is almost the same, namely 10.2±5.1 years in the Control Group and 12.2±6.5 years in the Treatment Group. Work experience is one of the external factors that can affect a person's knowledge and ability to do a task. The longer a person's work experience, the more skilled they will be in doing their job. Related to the research of Andriana et al. who examined the performance of early childhood education's teachers in terms of Educator Qualifications, Teaching Experience, and Training at Gugus Kembang Sepatu in Bengkulu City found that the performance of teachers whose teaching experience is more than 10 years better than teachers whose teaching experience is still under 10 years.[12]

The ability of the sample in assessing nutritional status has increased, both in the control and treatment groups. This is because, before the intervention, they had never attended any training on assessing nutritional status, so they answered simply, and at school, they did not monitor the nutritional status of children. The existence of aids in the form of anthropometric tables in the control group and anthropometric pocketbooks in the treatment group were used as a guide in conducting the assessment. Presentations and training on how to use the tables and pocketbooks have been provided to make it easier for the sample to assess the nutritional status of children. In this case, increasing the ability of teachers to assess the nutritional status of children requires habituation, teachers must be accustomed to assessing children's nutritional status so that they are more familiar and easier to use anthropometric tables and graphs listed in anthropometric pocketbooks so that it is easier to monitor children's nutritional status. The formation of attitudes/ability is influenced by personal experience, the culture of other people who are considered important, the mass media, educational institutions or institutions, religious institutions, as well as emotional factors in individuals.[13]

The increase in the ability of the sample was higher in the Treatment Group than the Control Group, because the anthropometry pocketbook was given guidance in determining nutritional status using graphs so that the sample was easier to assess nutritional status. Whereas in the Control Group using the tables listed in the Anthropometric Standards, the number and characteristics of the tables are quite large so that it makes the sample difficult and often chooses the wrong table, besides that, the sample must also compare the numbers listed in the table with the standards to decide whether the nutrition status is good, less or bad. The weakness in the use of tables is that the sample is often confused in choosing the appropriate table, often forgets, and does not even understand the standard. It can be said that the provision of media in the form of books accompanied by training can improve the knowledge and skills of the sample (early childhood education teachers).

The other results of different test analyses using the Independent Sample T-test (α = 0.05) found a significant difference in the teacher's ability to assess nutritional status with the index of BW/A, H/A, BW/H, and BMI/A in the control group and treatment group after intervention. Hadi conducted a similar study, regarding the effectiveness of nutrition education using the H/A index health monitor card in Indonesia (*kartu menuju sehat*; KMS) on the actions

of early childhood education's teachers in monitoring the growth of children aged 4-5 years in early childhood education school found that there was a difference or impact on the effectiveness of the H/A wall KMS training on increasing early childhood education's teacher knowledge and action in Aceh Besar District.[14] This is in line with the research conducted by Sariri on early childhood education teachers in several schools in the city of Surabaya, which found that there was a significant difference between the skills of teachers in providing emotional intelligence stimulation for early childhood before and after attending the training.[15] Another study by Rahayu and Purnamasari provided training to early childhood education's teachers in Wonosobo Regency also reported that there was a significant difference in early childhood education's teacher knowledge in conducting *SDIDTK* (Stimulation, Detection, Early Intervention of Growth) before and after being given training in the *SDIDTK* application combining lecture and demonstration methods.[16] Those various researches showed that training can improve one's knowledge and skills.

CONCLUSION

According to the results of this study, the average ability of early childhood education teachers to assess the nutritional status of children with the BW/A index before and after the intervention in the control group increased by 69.1% and in the treatment group increased by 235.9%. The H/A index before and after the intervention in the control group increased by 67.0% and in the treatment group increased by 220.5%. The BW/H index before and after the intervention in the Control Group increased by 71.5% and in the Treatment Group it increased by 225.8% and the average increase in BMI/A index before and after the intervention in the Control Group was 95.4% and 141.5% in the Treatment Group.

There was a significant difference in the ability of early childhood education teachers to assess the nutritional status of children with indexes of BW/A, H/A,

BW/H, and BMI/A in the Control and Treatment Group (p<0.05) after the intervention. The ability of teachers to assess the nutritional status of children has improved perfectly (>100%) with a significant difference in test analysis so that teachers are always expected to get used to monitoring nutritional status using the Child Nutrition Anthropometry Pocket Book.

CONFLICT OF INTEREST

The author has no conflict of interest regarding all elements in this study.

ETHICAL CONSIDERATION

This study has been approved by Ethical Committee of Health Polytechnic with ethical clearance references number LB.02.03/EA/KEPK/0553/2001.

AUTHOR CONTRIBUTION

All authors had contributed in manuscript writing and agreed for the final version of the article for publication.

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REFERENCES

1. Proverawati A. Nutrition Textbook for Midwifery. Yogyakarta: Nuha Medika; 2009.
2. WHO. Nutrition Landscape Information System (NLIS) Country Profile Indicators: Interpretation guide. Geneva: World Health Organization; 2010.
3. Health committee of Bali Province. Trends in Bali Nutrition Problems in 2015-2017. Denpasar: Health committee of Bali Province; 2017.
4. Health committee of Bali Province. Proportion of Very Short and Short Nutritional Status in Toddlers by District/City 2013-2018. Denpasar: Health Committee of Bali Province; 2018.
5. Supariasa IDN. Nutritional Status Assessment. Jakarta: Buku Kedokteran EGC; 2009.
6. Ministry of Health of the Republic of Indonesia. Regulation of the Minister of Health of the Republic of Indonesia Number 66 of 2014 concerning Monitoring of Child Growth, Development, and Developmental Disorders.

Jakarta: Ministry of Health of the Republic of Indonesia; 2014.
7. Government Regulation of Republic of Indonesia Number 60. 2013. Integrative Holistic Early Childhood Development. President of the Republic of Indonesia. (online serial). Available at: https://jdih.kemenpppa.go.id/ peraturan/ perpres_no.60-2013.pdf.
8. Pocock SJ. Clinical Trials A Practical Approach. Chichester. John Wiley & Sons; 2008.
9. The Law of Republic of Indonesia Number 13. 2003. The Law of Employment. (online serial). Available at: https://kemenperin.go.id/ kompetensi/UU_ 13_2003.pdf
10. The Law of Republic of Indonesia Number 13 of 1998. 1998. The Law of Republic of Indonesia Number 13 of 1998 concerning Elderly Welfare. Available at: www.bpkp.go.id/**uu**/filedownload/2/45/438.bpkp
11. Government Regulation of Republic of Indonesia Number 45. 2015. Implementation of the Retiring Guarantee Program. Available at: https://peraturan.bpk.go.id/Home/ Details/5613/ pp-no-45-tahun-2015.
12. Andriana J, Sumarsih, Delrefi D. The performance of early childhood education teachers in terms of Educator Qualifications, Teaching Experience, and Training. Potential Scientific Journal The performance of early childhood education teachers in terms of Educator Qualifications, Teaching Experience, and Training. Potential Scientific Journal. 2018;3(2):18-23. Available at: https://ejournal. unib.ac.id/index.php/potensia/article/view/2521/2683.
13. Azwar S. Human Attitude, Theory and Its Measurement. Jakarta: Pustaka Pelajar; 2011.
14. Hadi A, Affan I, and Alfridsyah A. Effectiveness of nutritional education using wall growthchart HFA index to the action teacher in monitoring growth of 4 -5 years in children of pre-school. Journal Action: Aceh Nutrition Journal. 2018;3(1):65-73. Available at: http://ejournal. poltekkesaceh.ac.id/index.php/an/article/view/101/58
15. Sariri N. The Effect of Emotional Intelligence Stimulation Training on Kindergarten Teachers' Knowledge and Skills in Developing Students' Emotional Intelligence. Journal PG-PAUD Trunojoyo. 2015;2(1):40-49. Available at: https://journal.trunojoyo. ac.id/ pgpaudtrunojoyo/article/view/1818.
16. Rahayu CD, Purnamasari I. Stimulation of Early Detection Intervention Growth (SDIDTK) Training to Increase Knowledge of Early Childhood Education Teachers in Conducting SDIDTK in Wonosobo District. Journal PPKM; 2019;6(1):31–36. Available at: https://ojs.unsiq. ac.id/index.php/ppkm/article/view/498.