JURNAL MIDPRO, Vol. 16 No. 02 (December, 2024): 135-148 **E-ISSN: 2684-6764**
Terakreditasi Nasional Peringkat 4 No. 36/E/KPT/2019
Available Online at http: http://jurnalkesehatan.unisla.ac.id/index.php/midpro

The Effectiveness of Using Gym Ball in Reducing Back Pain in the Third-Trimester Pregnant Women

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ABSTRACT

Back pain is one of the problems that pregnant women often experience during the third trimester. If the pain is not treated immediately, it will have serious consequences for the mother. One effort is simple physical therapy using a ball, which is useful for strengthening the abdominal and lower back muscles. It is usually called gymball training. This study aimed to determine how effectively a gym ball reduces back pain felt by pregnant women in the third trimester.This research used a pre-experiment with one pretest-posttest group and a sample of 30 pregnant women in the Singojuruh Public Health Center area. It was conducted from September to October 2023. This study applied simple random sampling techniques to determine the sample and analyse data using the Wilcoxon test.This study revealed that the prevalence of back pain in pregnant women was reduced from 43.3% to 6.7% for pain in the moderate category. Furthermore, 10% of respondents no longer felt back pain after using the gymball. Based on the Wilcoxon signed ranks test results on data before and after testing, a p-value of 0.000 was obtained, which shows that using a gym ball effectively treats back pain in pregnant women in the third trimester. The use of a gym ball can be used as a complementary care alternative to relieve pregnant women's back pain during pregnancy, especially in the third trimester. It is hoped that this gymball can be implemented in health facilities in classes for pregnant women.

Keywords: Gymball; Pregnancy; Toddlers; Back pain

Article history :

Received: 3 Agustus 2024
Received in revised form: 13 September 2024
Accepted: 20 Oktober 2024
Available online: 15 Desember 2024

INTRODUCTION

Pregnancy causes physiological changes, namely physical and psychological. These changes are what cause discomfort during pregnancy. During pregnancy, discomforts such as disorders are commonly experienced by mothers, such as urination, vaginal discharge, nausea, vomiting, leg cramps, spinal syndrome, and back pain, among others. If back pain is not treated immediately, this condition has the potential to cause prolonged pain until after giving birth and can develop into chronic back pain, which is more complex to treat. Pregnant women suffering from back pain may feel the pain radiating to the pelvis, causing them difficulty walking even if they use assistive devices. According to WHO (2011), 70% of pregnant women in Australia experience back pain. In Malaysia, low back pain varies in each trimester of pregnancy, especially in the first trimester; pregnant women over 21 weeks experience 36.5% mild back pain, 46% moderate pain, and 17.5% severe back pain [1]. The prevalence of low back pain during pregnancy increases as each trimester progresses. In the first trimester, it reached 16.7%, 31.3% in the second, and 53% in the third [2]. Ratnasari's 2015 research found that in various regions in Indonesia, around 60–80% of pregnant women experience pain in the lower back [3]. Around 65% of all pregnant women in the third trimester felt back pain in East Java province in 2015 [4]. Pregnancy in TM III often experiences back pain. Ball-assisted physical exercises, which include sitting on a ball while shaking the pelvis, effectively reduce pain [5].

Using a gymball is a complementary therapy. Based on the Indonesian Republic Minister of Health Regulation No. 1109/Menkes/Per/IX/2007 of 2007, regulations regarding implementing complementary alternative medicine in health service settings were established. Complementary therapy is a term for medical practice actions that are not part of standard medical care, have been carefully evaluated, and have been proven safe and effective. This therapy includes various health practices aimed at primary, secondary and tertiary prevention programs through updated evidence-based special education [6 6]. A preliminary survey by researchers at the Singojuruh Community Health Center on June 12 2023, found that of the ten pregnant women in their third trimester who visited Posyandu, 7 complained of lower back pain. This pain tends to be more intense at night and lasts throughout the third trimester of pregnancy. To relieve the pain, they rest or lie down, apply a warm compress to the back area and do a light massage on the mother's back. They said they had never used a gym ball. Based on the background above, this research aims to evaluate the effectiveness of using gym ball in relieving back pain in pregnant women seeking treatment at the Singojuruh Public Health Center, Banyuwangi Regency.

METHOD

This study used a quantitative approach with a pre-experimental one-group pretest-posttest design, without a control group; the instrument used was a questionnaire, a sample of pregnant women who met the criteria in the Singojuruh health centre working area using the Simple Random Sampling Technique with a total of 30 respondents. Univariate analysis was carried out by applying a frequency distribution based on percentages. A bivariate analysis was conducted to analyze the effectiveness of using a gym ball in reducing back pain in third-trimester pregnant women. This study uses the Wilcoxon test as the statistical method [7].

RESULTS

Table 1. Table of back pain in third trimester pregnant women before and after using gym ball

Pain Scale		Amount	Frequency (%)
Before	No Pain	0	0
	Mild Pain	17	56.7
	Moderate pain	13	43.3
	Controlled Severe Pain	0	0
	Uncontrolled severe pain	0	0
After	No Pain	3	10
	Mild pain	25	83.3
	Moderate pain	2	6.7
	Controlled severe pain	0	0
	Uncontrolled severe pain	0	
Total		30	100

Table 1. It shows that back pain before and after using the gym ball decreased in pregnant women in the third trimester. Looking at the data on back pain for pregnant women before using the gym ball carried out by pregnant women in the third trimester at the Singojuruh Health Center in 2023, it was found that almost all Pregnant women in the 3rd Trimester felt pain in their backs with a higher number of mild pain categories, namely 17 respondents (56.7%). Meanwhile, after using the gym ball, it was found that three pregnant women (10%) felt no pain, 25 pregnant women (83.3%) felt mild pain, and two pregnant women (6.7%) felt moderate pain. The results of this study show a reduction in back pain levels in pregnant women from 43.3% to 6.7% in the moderate pain category. In addition, as many as 10% of respondents experienced complete relief from back pain after using the gymball.

Table 2. Effectiveness of Using Gym Balls in Reducing Back Pain in third-trimester Pregnant Women

Intervention *gymball*	Pre	Post	p-value*
N	30	30	0,000
S.E	0.170	0.194	43.3
Mean	3.40	2.20	0
Std deviation	0.932	1,064	0
Mean Difference		1.2	10
*Wilcoxon test			

Based on table 2. Statistical analysis was carried out using the Wilcoxon test because the data distribution was abnormal, with the p-value obtained being 0.000. With a p-value lower than 0.05, this shows that using gymball effectively reduces back pain in pregnant women in the third trimester. Data from pre- and post-tests showed that of the 30 respondents who used the gym ball, 21 felt a decrease in their back pain levels, and 9 experienced no change.

DISCUSSION

1. Anthropometric status of stunted children before the consumption of mackerel nuggets.

From the research results, it was found that all toddlers in this study had anthropometric status in the short category (stunted) (threshold (z score) -3 SD to < -2 SD), namely 30 respondents (100%), and none of the toddlers in this study had anthropometric status in the high category (threshold (z score) +3 SD), normal (threshold (z score) -2 SD to +3 SD), and very short (severely stunted) (threshold (z score) < -3 SD)

Stunting is a chronic malnutrition problem caused by a lack of nutritional intake over a long period of time, this causes disorders in the future, namely experiencing difficulties in achieving optimal physical and cognitive development.[15] Stunted children have a lower Intelligence Quotient (IQ) than the average IQ of normal children.[16] Stunting is defined as a condition where the nutritional status of a child according to height/age with a Z Score value = < -2 SD, this indicates a short or very short body condition resulting from growth failure [17]. Stunting in children is also a risk factor for death, low motor development problems, low language skills, and functional imbalance.[18] Stunting is a problem of growth failure experienced by babies under five years old who experience malnutrition since in the womb until the baby is born, stunting itself will begin to appear when the baby is two years old. Stunting is a problem of malnutrition with a fairly long

period so that there is a disturbance in the growth of height in children who are lower or shorter (dwarf) than the standard for their age.[19]

Stunting in toddlers is influenced by various factors such as maternal factors, paternal factors, infant and toddler factors, and environmental factors. In mothers who have a history of stunting, the risk of toddler stunting will increase when compared to mothers of toddlers who do not have a history of stunting. Mothers of toddlers who have a history of stunting will store information related to stunting in their genetics. Human growth itself is influenced by genetics. Genetics is one factor that cannot be changed because it is passed down directly from parents to children. For full-term babies, the size at birth reflects the influence of the uterine environment, at the age of 2 years the baby is correlated with the average height of the parents which indicates the influence of genetics. Other references also mention that after the age of 3 years the child's height is significantly correlated with the height of the parents [20].

Genetics that carry the short trait are thought to affect hormonal work that plays a major role in growth, especially linear growth. Hormones greatly affect the body's condition through changes in growth. The presence of growth hormone affects the accumulation of cortical bone and may stimulate growth and height increase. Short parents tend to have short children because of the genetic factors they pass on to their children, so parents can only maximize environmental factors to support their children in achieving the maximum growth they can achieve.[21]

The characteristics of the mother or the condition of the mother including height are genetic factors that cause stunting in toddlers. Parents who have short height due to genes carrying short chromosomes are likely to pass on the short trait to their children. This is due to the pathological condition of growth hormone deficiency owned by the gene carrying the chromosome, if not supported by adequate intake to support growth, in the next generation it will have an impact on growth failure or stunted.[22] Height is a form of genetic expression, and is a factor that is passed down to children and is related to the incidence of stunting. Children with short parents, either one or both, are at greater risk of growing short than children with parents of normal height. If the short nature of the parents is caused by nutritional or pathological problems, then the short nature will not be passed down to their children

One or both parents who are short due to a pathological condition (such as growth hormone deficiency) have genes on their chromosomes that carry the trait for shortness, increasing the chance that their child will inherit the gene and grow up stunted. However, if the parents are short due to nutritional deficiencies or illness, the child may grow to normal height as long as the child is not exposed to other risk factors.[23] Mamabolo et al explains that parents who are short because

of genes in chromosomes that carry the trait of shortness are likely to pass on the trait to their children. If the shortness of the parents is caused by nutritional or pathological problems, then the shortness of the trait will not be passed on to their children. This study did not examine the factors that influence the mother's height so it cannot be distinguished whether the mother's current height is a genetic influence or due to pathological or malnutritional influences.[23]

A mother who has a short height (<150 cm) is likely to give birth to a child with a short height as well. This will further increase the possibility of giving birth to a short child if the mother has a gene in the chromosome that carries the trait of being short. One effort that can be made to reduce the risk of a mother giving birth to a child with stunting is to improve the mother's nutritional intake. Improving the nutritional intake consumed must begin when the mother is a teenager. Adequate nutritional intake during pregnancy is also needed by mothers with short height. This is intended so that the fetus in the womb gets enough nutritional intake needed to grow and develop optimally. Supervision is also important to be carried out since the toddler is born. Toddlers born to mothers with short height require strict supervision and monitoring to ensure that the toddler can grow and develop optimally.

2. Anthropometric status of stunted children after the consumption of mackerel nuggets.

From the research results, it was found that most toddlers in this study had anthropometric status in the short category (stunted) (threshold (z score) -3 SD to < -2 SD) namely 25 respondents (83.3%), a small number of toddlers in this study had anthropometric status in the normal category (threshold (z score) -2 SD to +3 SD) as many as 5 respondents (16.7%), and none of the toddlers in this study had anthropometric status in the high category (threshold (z score) +3 SD), and very short (severely stunted) (threshold (z score) < -3 SD)

Stunting is a growth disorder that occurs in children under the age of two. Stunting has a negative impact on the development and growth of children if not addressed early. Children who do not receive exclusive breastfeeding and are given MP-ASI too soon are risk factors for stunting in children 24. Maternal nutritional factors before and during pregnancy are indirect causes that contribute to fetal growth and development. Pregnant women with malnutrition will cause the fetus to experience Intrauterine Growth Retardation (IGR), so that the baby will be born with malnutrition, and experience growth and development disorders. Children who experience growth retardation are caused by a lack of adequate food intake and repeated infectious diseases, and increased metabolic needs and reduced appetite, resulting in increased malnutrition in children. This situation makes it increasingly difficult to overcome growth disorders which ultimately have the potential for stunting 25

Stunting increase the risk of child mortality, negatively impacts cognitive and motor development, reduces school performance, increases the risk of over nutrition and non-communicable diseases, and reduces productivity in adulthood. However, stunting can be improved, one of which is by increasing nutritional intake in toddlers. Stunting that has occurred if not balanced with catch-up growth results in decreased growth, the problem of stunting is a public health problem related to increased risk of illness, death and obstacles to growth, both motoric and mental. Stunting is formed by growth faltering and inadequate catch-up growth which reflects the inability to achieve optimal growth, this reveals that groups of toddlers who are born with normal weight can experience stunting if the fulfillment of subsequent needs is not met properly

Stunting management is an effort that continues to be pursued and intensified by the Indonesian Government in its efforts to overcome the problem of stunting. Various efforts continue to be made through increasing access and quality of services, increasing cross-program/sector cooperation, and increasing community empowerment. Strengthening the technical and management of all resources including planning, implementation of mobilization, and supervision of control is very important to achieve the expected goals. Integrated malnutrition management involves all stakeholders. Malnutrition and stunting toddler services require solid collaboration from the nutrition care team both in primary and secondary health facilities. Prevention and management of malnutrition must be carried out in a team approach consisting of doctors, nurses/midwives and nutritionists/dieticians (nutrition care team), and other health workers

In order to handle stunting cases, a doctor is responsible for conducting anamnesis and physical examination, as well as establishing a diagnosis based on clinical anthropometry and laboratory, determining the choice of action, laboratory examination and treatment, determining drug therapy and diet prescription in collaboration with nutritionists (nutritionists), conducting disease counseling, monitoring and evaluating the patient's medical development and nutritional status, and being responsible for medical care and for the patient as a whole. Then for nurses / midwives are responsible for conducting anthropometric measurements, carrying out nursing actions on the doctor's instructions, assisting in monitoring and evaluating feeding to stunting sufferers, being responsible for nursing care, including checking vital signs such as temperature, respiratory rate, and pulse rate of stunted toddlers. Nutritionists / dietitians are responsible for conducting nutritional assessments, making nutritional diagnoses, making nutritional interventions, for example making formulas and compiling food menus and providing nutritional counseling, monitoring and evaluating the interventions given including feeding to stunting patients, and being responsible for patient nutritional care. Then the Pharmacy Staff is responsible for providing drugs

based on doctor's prescriptions, providing ReSoMal (Rehydration Solution for Malnutrition), consisting of oralit, granulated sugar and mineral mix, supervising drug and food interactions, and helping to monitor and evaluate the administration of drugs to patients. The last stakeholder is the growth and development team. The tasks of the growth and development team include conducting screening for developmental disorders, consulting with specialist doctors for patients being treated if needed, providing management according to the developmental disorders encountered, conducting periodic evaluations and analysis of patient conditions, and making records and reports

In an effort to ensure the effectiveness of the policy, efforts to accelerate stunting prevention need to target priority groups that include pregnant women, breastfeeding mothers, and children aged 0-23 months, or called households of the First 1,000 Days of Life. This group is the priority target of the National Strategy for Accelerating Stunting Prevention. The First 1,000 Days of Life is the most critical period in a child's growth and development. In Indonesia, the greatest growth disorders occur during this period. As many as 48.9% of pregnant women suffer from anemia and some others experience Chronic Energy Deficiency (CED). This causes the prevalence of babies with Low Birth Weight (LBW), which is one of the main causes of stunting, to remain high, at around 6.2%. Inappropriate breastfeeding, food, and parenting patterns in the 0-23 month period interfere with children's growth and development. Riskesdas 2013 noted that decreased child growth and development is the result of poor eating patterns for babies and children. This causes an increase in the prevalence of stunting from 29% (0-6 months), to 39% (6-11 months), and to 42% (age 24-35 months). However, stunting is also influenced by maternal nutrition in the previous period, especially in the pre-conception period, namely women of childbearing age and adolescent girls

Efforts to manage stunting and wasting emphasize the importance of active participation of families and communities as well as related cross-sectors in efforts to overcome malnutrition in toddlers. This effort also recommends outpatient services for toddlers aged 6-59 months with malnutrition without complications. If there are complications, the toddler needs to be hospitalized until the complications are resolved and then allowed to undergo outpatient care until fully recovered. For infants under 6 months old with malnutrition, hospitalization is recommended, even if there are no complications. An integrated malnutrition management approach can be carried out by increasing the number of malnourished toddlers who are detected early, the scope of case handling, increasing the level of compliance, thereby reducing dropout of toddlers who undergo outpatient / inpatient care, and identifying the proportion of cases that are successfully cured.

Integration and cooperation from various stakeholders will make stunting handling easier and faster to do

3. The effect of mackerel tuna consumption on changes in anthropometric status of stunted children

From the results of data analysis on toddler height (pre-test), the average toddler height was 81.40 cm, with a minimum toddler height of 78 cm and a maximum toddler height of 86 cm. For toddler height (post-test), the average toddler height was 83.16 cm, with a minimum toddler height of 80 cm and a maximum toddler height of 88 cm. From the results of the analysis of changes in toddler anthropometric status, it was found that 5 toddlers experienced changes in anthropometric status, which were originally short (stunted) (threshold (z score) -3 SD to < -2 SD) changing to normal (threshold (z score) -2 SD to +3 SD). From the results of the Wilcoxon sign rank test, the Asymp Sig (2-tailed) value was obtained of 0.000 < significance α (0.05) so that the research hypothesis was accepted, which means that there is an effect of mackerel fish nugget consumption on changes in the anthropometric status of stunted toddlers at the Rembang Health Center, Pasuruan Regency

The results of this study are similar to research conducted Septiana about the effect of fish nuggets on changes in the height of stunted toddlers aged 24-59 months in the Alas Health Center area.26 From the results of the study, it was found that there was a significant difference between the control group and the treatment group (given an intervention of consuming fish nuggets) with a p value of 0.042 so that the results of the study concluded that providing fish nuggets as additional food for stunted toddlers will help stunted toddlers in meeting nutritional needs during growth and increase the height of stunted toddlers. The results of this study are also supported by research conducted by Saranani et al on stunting prevention through specific nutritional interventions of fish and egg nuggets in Torobulu Village, South Konawe Regency.27 From the results of the intervention carried out for a period of 3 months, a significant increase in height and weight was obtained in stunted toddlers, so it can be concluded that the provision of mackerel nuggets has an effect on increasing the height and weight of stunted toddlers (p value: 0.031)

The management of stunting toddlers basically involves many policy makers and various focuses. One focus in handling stunting incidents in toddlers is to ensure that stunted toddlers have a good appetite. When the appetite of stunted toddlers has been formed, then food diversification is a continuation of the focus of the activities carried out. One type of food ingredient that can be applied to overcome the problem of stunting is using mackerel. The levels of omega 3 fatty acids in mackerel are quite high where the levels of omega fatty acids in mackerel are around 8.5 grams

/ 100 grams of meat. In addition, mackerel also has an Eicosapentaenoic Acid (EPA) content of around 0.93 grams / 100 grams of meat and Docosahexaenoic Acid (DHA) of around 5.7 grams / 100 grams of meat. In 100 grams of mackerel, there are various nutrients such as 21.3 grams of protein, 2.2 grams of carbohydrates, 136 milligrams of calcium, 3.4 grams of fat, 69 milligrams of phosphorus, 0.8 grams of iron, 214 milligrams of sodium, 245 milligrams of potassium, 0.20 grams of copper, 1.1 milligrams of zinc, 0.26 grams of thiamine (vitamin B1), 0.03 milligrams of riboflavin (vitamin B2), and 0.2 milligrams of niacin (vitamin B3). Mackerel also has a fairly high protein content. Based on the results of previous research, 100 grams of processed mackerel products contain 16.72% protein

Protein is one of the basic and important nutrients for the growth of toddlers and children. The amino acid content in protein supports the work of hormones and enzymes in the child's body to improve brain function and I think, strengthens the immune system, is useful in the formation of muscles, hair and also collagen. Essential amino acids in protein play a significant role in toddler growth, including in achieving toddler height and weight according to their age. Essential amino acids will help toddlers overcome stunting problems experienced by toddlers. Protein also plays an important role in achieving toddler height according to age. Protein can trigger increased insulin levels such as growth factor I (IGF-I), a hormone that stimulates child growth. Protein is also a macronutrient that is important for the body, especially during growth and development

Nutritional problems in toddlers in Indonesia are still health problems that occur due to an imbalance between intake and body needs. Nutritional imbalance causes toddlers to experience many health problems and one of them is stunting. In children who experience stunting, some signs and symptoms that can be found include signs of late puberty, poor performance on attention and learning memory tests, late tooth growth, at the age of 8-10 years the child becomes quieter, does not make much eye contact, the child's growth slows down and the child's face looks younger than usual. The problem of stunting that occurs in toddlers must be addressed as early as possible because stunting has an impact on the stunted toddler itself. In the short term, stunting that occurs in toddlers has the potential to cause disorders of brain development, physical growth, intelligence, and metabolic disorders in the body, while in the long term it is easy to get sick, the emergence of diabetes, heart and blood vessel disease, obesity, cancer, stroke, disability in old age, and poor work quality so that productivity becomes low. The incidence of stunting is one of the problems that is considered serious when associated with the high morbidity and mortality rates, the incidence of obesity, poor cognitive development, and low levels of income productivity. These various problems are very easy to find in developing countries like Indonesia

Nutritional status in a toddler (aged 1-5 years) requires more nutrition because this period is considered the golden age. During this period a child will experience physical and mental development and will discover various new things, so that the fulfillment of nutrition during this period plays a very important role. Stunting that has occurred if not balanced with catch-up growth results in decreased growth, the problem of stunting is a public health problem related to increased risk of illness, death and obstacles to growth both motoric and mental. Stunting is formed by growth faltering and inadequate catch-up growth which reflects the inability to achieve optimal growth, this reveals that groups of toddlers who are born with normal weight can experience stunting if the fulfillment of subsequent needs is not met properly

Parenting patterns in providing food to toddlers are also very important during their growth because good child quality can be obtained from fulfilling the needs of growth and development aspects so that an optimal future is achieved. There are many nutritious foods that can be given to toddlers during this growth period. One of the foods that can be used to overcome stunting is by consuming mackerel. However, in fact, there are rarely toddlers who want to consume mackerel directly. Although mackerel is processed in the form of grilled or fried fish, at the age of toddlers they are more interested in ready-to-eat food. Mackerel nuggets are a diversification of food ingredients where mackerel is used as the main ingredient in its manufacture. The high nutrition in mackerel will indirectly help toddlers in overcoming the stunting problems they experience

Mackerel processed into nuggets will make it easier for parents to serve quality food to their toddlers. In addition, mackerel processed in the form of nuggets is also more popular with toddlers compared to fried or grilled mackerel. When stunted toddlers like mackerel nuggets, then indirectly stunted toddlers will ensure that they are able to meet the nutritional needs of their bodies during growth and development. Parents of stunted toddlers who understand the importance of fulfilling nutrition and nutrition for their toddlers will certainly try to provide mackerel that can be consumed by their toddlers whenever their toddlers want. In order to ensure that every parent of a stunted toddler knows about the potential of mackerel to overcome the problem of stunting that occurs, health workers need to actively conduct socialization and education about it. In addition, the ease of obtaining mackerel is also a determining factor. Pasuruan Regency, which is famous for its marine fish products, has high potential in overcoming the problem of stunting using mackerel as a basic food ingredient.

CONCLUSION

From the results of the research that has been conducted, several conclusions can be drawn as follows: Anthropometric status of stunted toddlers before being given intervention of consuming mackerel fish nuggets from the results of the study, it was found that all toddlers in this study had anthropometric status in the short category (stunted) (threshold (z score) -3 SD to <-2 SD) namely 30 respondents (100%). Anthropometric status of stunted toddlers after being given intervention of consuming mackerel fish nuggets from the results of the study, it was found that most toddlers in this study had anthropometric status in the short category (stunted) (threshold (z score) -3 SD to <-2 SD) namely 25 respondents (83.3%), and a small number of toddlers in this study had anthropometric status in the normal category (threshold (z score) -2 SD to +3 SD) as many as 5 respondents (16.7%). There is an effect of consuming mackerel fish nuggets on changes in the anthropometric status of stunted toddlers with an Asymp Sig (2-tailed) value of 0.000 <significance α (0.05).

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