12 (2) (2023) 209 - 215
Journal of Physical Education, Sport, Health and Recreations
http://journal.unnes.ac.id/sju/index.php/peshr

Effect of Fe Supplement on The Physical Fitness of Girls at School

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Article History

Received June 2023
Accepted June 2023
Published Vol.12 No.(2) 2023

Keywords:
Physical fitness; Fe supplements; physical activity,; Female Adolesence.

Abstract

Physical fitness protects the body from viruses (Santoso 2021) post-covid-19. In Yogyakarta, 63.17% of students have "Not Good" physical fitness, and 51.61% of are Girls. Physical activity is related to physical fitness (Alamsyah, Hestiningsih et al. 2017), a lack of iron intake also causes low physical fitness (Sitoayu, Yuslaili et al. 2020). In 2018, only 35.1% of girls received iron tablets in Bengkulu Province (NINGSIH 2020). Does the low achievement of iron tablets cause low physical fitness? Objective; Knowing the Effect of Fe Supplements and Physical Activity on Physical Fitness. The method used in writing this journal is a Literature Review of 18 research journals from 2000 to 2023 obtained from the Google Scholar and Pubmed search engines. Conclusion; There are 4 (four) main factors that have been proven significant several times and were re-examined by this new researcher, these factors include; 1. Physical activity, 2. Hemoglobin levels, 3. Iron intake, and Anemia. the relationship between iron supplementation and physical fitness of female adolescents at school has not been proven.

How to Cite

Vitriani, R., Sitorus, R., & Novrikasari. (2023). Effect of Fe Supplement on The Physical Fitness of Girls at School. Journal of Physical Education, Sport, Health and Recreation, 12 (2), 209-215.

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p-ISSN 2460-724X
e-ISSN 2252-6773

INTRODUCTION

Maintaining physical fitness in the post-covid-19 pandemic era is very important because the better a person's physical fitness, the better he will protect his body and body from existing viruses (Santoso 2021). In addition to iron (Fe) intake which has a relationship to physical fitness (Sitoayu, Yuslaili et al. 2020), physical activity has a fairly strong positive relationship to the physical fitness of class XI students at Vacational School number 11 ini Semarang (Alamsyah, Hestiningsih et al. 2017), Nutritional Status also has a relationship to the physical fitness of young women in Surakarta (Iryanti, Rustiningsih et al. 2015)(Iryanti, Rustiningsih et al. 2015).

The results of the research on Junior High School students in the city of Yogyakarta amounted to 63.17% of students still had a level of physical fitness which included "Not good" mostly consisting of 51.61% female students and a small portion of male students namely 11.56% (Ulvie 2011). This is related to the relationship between anemia in youth Girls so that the physical fitness score is "not good" higher in young women than young men (Retnaningtyas, Muwakhidah et al. 2014).

The incidence of anemia in female adolescents occurs due to the low proportion of consumption of blood-supplemented tablets at school, namely only 35.1% or 72,685 female adolescents who receive iron (Fe) tablets in Bengkulu Province, which is the cause of the increased prevalence of anemia by 63.6% in Bengkulu City. (NINGSIH 2020). In theory, the impact of Anemia can reduce the body's resistance resulting in reduced learning ability and endurance of female adolescents (PUTRI). The direct relationship between consumption of iron tablets and physical fitness cannot be proven in 2020 research (Ramadhon, Rahfiluddin et al. 2020).

The Government has implemented a program of giving Iron Supplement Tablets to young girls at school, but one of the benefits of Iron Supplement Tablets has not been fully felt by young women, namely Physical Protectors. So the purpose of this research is to find out what factors are the cause of the low proportion of physical fitness of young women as material for evaluating the success of this Iron Supplement Tablets program.

METHODS

The method used in writing this journal is a Literature Review of 18 research journals from 2000 to 2023 obtained from the Google Scholar and Pubmed search engines.

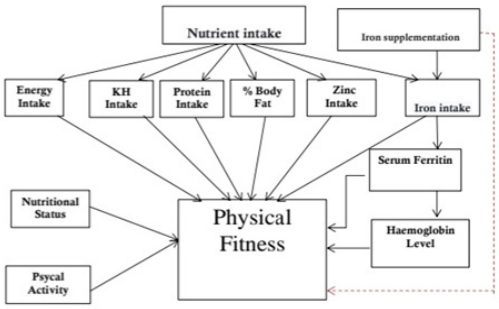

Figure 1. The Theoretical framework of factors related to physical fitness.

RESULTS AND DISCUSSION

The writing of this literature review began in May 2023, the topic of physical fitness was taken because of the post-Covid 19 pandemic situation and conditions which are very important in maintaining youth's immune system so that girls can focus on learning and achieving (PUTRI). There are 17 research journals taken from 2000 to 2022 using the Google Scholar and PubMed search engines.

The results of a literature review of 17 research journals on female adolescent physical fitness found several factors that were proven to have a significant relationship with physical fitness. These factors include; Physical activity as many as 5 research results, Anemia as many as 3 research results, Iron Intake as many as 2 research results, followed by Hb Levels, and Nutritional Status also as many as 2 research results, while several other factors related to Physical Treatment and mutually support the results of similar studies that has been explained. The following is a tabulation of the results of a literature review from sixteen journals on physical fitness **Table 1.**

Based on the literature review table above, it was found that several factors were proven to be significantly related to physical fitness, especially in young women, there were 7 (seven) research results that were most related to physical fitness, namely physical activity. Physical activity factors have been studied by 3 (three) studies in 2022 (during the Covid-19 pandemic) by (Zhang 2022), (Boonsem, Malarat et al. 2022), and (Mubarok, Dinangsit et al. 2022). And it was re-examined by (Hardiansyah, Alamsah et al. 2023) (post-pandemic) and was researched in 2017 by 3 (three) researchers; (Pompano and Haas 2017), (Alamsyah, Hestiningsih et al. 2017), and (Murbawani and Firiana 2017). Factors

Table 1. Tabulation of the results of a literature review from sixteen journals on physical fitness

Researcher Name	Title	Country	Year	Research methods	Research result
A. Hardiansyah, dkk	Analysis Of Determinant Factors Of Physical Fitness For Youth Female At Madrasah Aliyah	Indonesia	2023	Cross sectional design with a total sample of 87 female students. Samples were taken using a proportionate stratified sampling technique. Data on hemoglobin levels were taken from capillary blood which was then measured using the easytouch GCHB brand digital capillary blood (Point of Care Testing), while nutritional status was measured using the Body Mass Index indicator for age (BMI/U), percent fat using a bioimpedance tool. analysis (BIA) and physical activity was measured using the International Physical Activity Questionnaire (IPAQ). Bivariate analysis in this study used the Gamma test and multivariate used the ordinal logistic regression test.	The results of this study showed that the sample had normal hemoglobin levels (67.8%), good nutritional status (79.3%), normal fat percentage (67.8%) and strenuous physical activity (49.4%). %). The results of the bivariate analysis showed that there was a relationship between hemoglobin level ($p<0.001$), nutritional status ($p=0.005$), percent fat ($p<0.001$) and physical activity ($p<0.001$) and female adolescent physical fitness.
Zhang, Yinghong	An Empirical Study on the Influence of College Students' Physical Fitness on the Level of Public Health	China	2022	Method by accurately assessing the effect of implementing physical fitness	Level of physical fitness, frequency of physical exercise and physical injury are key factors that affect physical fitness which have a serious impact on public health approximately 70 - 80%
Boonsem, Aungkana., et, all	Relationship between the factors affecting exercise behavior and physical fitness among university students	Brazil	2022	Causal research design based on "Precede Framework"	Predisposing, enabling, reinforcing factors in the concept of "Precede Framework" have a positive effect on sports behavior. Student sports behavior is continuously carried out causing changes in their physical fitness and improving all aspects
Lengkana, dkk (Buku)	Physical Fitness Learning	Indonesia	2022	Summarizes some of the findings that link physical activity to physical fitness	Describe some of the benefits of physical activity and physical fitness, as well as other factors related to academic performance
Santoso, Teguh	Analysis of the Influence of the Covid-19 Pandemic Period on the Physical Fitness of Guntur 1 Public High School Students	Indonesia	2021	Quantitative random sampling research method using a Likert questionnaire	The results of the Karl Pearson correlation test p 0.000 <0.05 there is a correlation between Physical Education learning, Physical Education and physical fitness during a pandemic.
Sitoayu, dkk	Correlation between Iron Intake, Hb Levels and Physical Fitness of Vegetarian Adolescents at the Maitreyawira Buddhist Training Center	Indonesia	2020	Cross Sectional Random Sampling Design using the Spearman Rank test	It was found that 43.9% of the physical fitness of vegetarian adolescents was "low" and from the results of the correlation test there was a relationship between iron intake (p 0.002) and Hb levels ($p = 0.014$) on the physical fitness of vegetarian adolescents.
Romadhon, dkk	The Relationship Between Tablet Fe Supplement Consumption With Physical Fitness (Study on female students at SMA Negeri 15 Semarang)	Indonesia	2020	Analytical descriptive research design with a cross sectional approach to 67 female students, physical fitness measurement method using the Harvard Step test, analysis test using Rank Spearman	The statistical test results yielded a p-value (0.165) which stated that there was no relationship between the consumption of iron tablets and the physical fitness of female students.

McClung, J. P.	Iron, Zinc, and Physical Performance	USA	2019	To review the relationship between iron and zinc status and physical performance.	A decrease in physical performance in individuals with poor iron and/or zinc status, whereas in individuals with adequate iron and zinc status proves the role of Fe & Zinc in optimizing poor physical performance
Pompano & Haas	Efficacy of iron supplementation may be misinterpreted using conventional measures of iron status in iron-depleted, nonanemic women undergoing aerobic exercise training	New York	2017	Aims to determine whether aerobic exercise can change the assessment of the effectiveness of iron supplementation in improving conventional measures of iron status in 72 non-anemic iron-deficient Chinese women. Analyzed by linear mix test	Regular aerobic exercise can reduce the effectiveness of iron supplementation in increasing serum ferritin, so further research is needed on conventional iron status measurements that accurately reflect iron metabolism in non-anemic women who are physically active.
Alamsyah, dkk	Factors related to physical fitness in class xi adolescents at SMA Negeri 11 Semarang	Indonesia	2017	This type of research is an analytic survey with a cross sectional approach. The population is class XI students totaling 525 students, then a sample of 183 students is taken. Primary data is in the form of questionnaires to determine physical activity and anxiety levels, while measurements of body weight and height are needed to determine Body Mass Index. In addition, measurements of physical fitness were carried out using the Cooper Test method. While secondary data in the form of active student information class of 2015 was obtained from the administrative office student center. Statistical analysis used Spearman's rank test and Pearson Product Moment correlation test.	From the results of the bivariate test at $\alpha = 0.01$, a significant positive relationship was found between physical activity and physical fitness ($p = 0.000$ and $r = 0.314$), a significant negative relationship between anxiety levels and physical fitness ($p = 0.000$ and $r = -0.284$) , and a significant negative relationship between Body Mass Index and Physical Fitness ($p=0.000$ and $r=-0.272$).
Murbawani, dkk	The relationship between percent body fat and physical activity with the level of physical fitness of female adolescents	Indonesia	2017	Analytical study with cross sectional design on 40 adolescents aged 15-17 years using purposive sampling technique. Physical fitness was measured using the multistage fitness test method, % fat with the BIA Omron HBF 200, physical activity with the PAQ for Adolecensent	47.5% level of physical fitness for young women is low, there is a relationship between % fat and physical fitness level (p 0.0001), there is a relationship between physical activity and physical fitness level (p 0.001) and there is a relationship between energy intake (p 0.003) and KH intake (p 0.002) on physical fitness.
Iryanti, dkk	Correlation between Nutritional Status and Anemia Incidence with Physical Fitness in Class X and XI Young Girls at SMA Muhammadiyah 1 Surakarta	Indonesia	2015	Observational method with cross sectional design on 40 samples selected by random sampling, nutritional status measurement with BMI, anemia status measurement with Cymmethemglobin method, physical fitness measurement with Harvard step test	There is a relationship between nutritional status and physical fitness.
RP. Sukmajati, dkk	Correlation between Micronutrient Intake and Body Fat Composition with Student Fitness Level at UNY Football UKM	Indonesia	2015	Cross sectional method on 36 samples selected by simple random sampling, intake of micronutrients by 24-hour recall method, % fat composition by BIA measurement, physical fitness measurement by Bleeptest. Statistical test with Shapiro Wilk (sample < 50) correlation test with Rank Spearman.	There is a relationship between iron intake and physical fitness (p 0.042) and there is a relationship between % body composition and physical fitness level (p 0.004), while Vit. B1, B6 & Vit. C has no relationship to physical fitness.

Retnaningtyas, dkk	The Relationship between Anemia Incidence and Physical Fitness and Learning Achievement in Young Girls at SMP Negeri 4 Batang	Indonesia	2014	This type of research was Observational with a cross-sectional approach to 52 female students selected by purposive random sampling. Anemia data were obtained from Hb measurements, physical fitness measurements using the Harvard Step test method, and learning achievement from exam results	Spearman rank analysis univariate anemia 57.7% , low physical fitness 36.5% and there is a relationship between anemia (p 0.000) r ; 0.781 to learning achievement and there is also an anemia relationship to learning achievement (p 0.000) r 0.506
Ulvie, Yuliana Noor Setiwati	Level of Physical Freshness, Nutritional Status and Nutrient Intake of Breakfast in Public Middle School Students in Yogyakarta City	Indonesia	2011	The method used was an observational cross-sectional design and a case-control design. The research sample was junior high school students aged 13-15 years, using random sampling technique. Data analysis using the t test.	The prevalence of poor physical fitness is 63.17%. There was no significant difference in the intake of energy and protein for breakfast in male students between the groups with poor and good levels of physical fitness (p value> 0.05). There was a significant difference in the intake of energy and protein nutrients for breakfast among female students between groups with poor and good levels of physical fitness (p value <0.05). There was a significant difference in nutritional status between the groups with poor and good levels of physical fitness (p value <0.05). There are differences in the level of physical fitness between male and female students. Nutritional status and breakfast intake affect different levels of physical fitness
Nuraini, dkk	Correlation between consumption levels of iron and vitamin C with the physical fitness of elementary school children	Indonesia	2010	Observational design with a cross-sectional approach on 38 elementary school subjects grades 4 & 5	89.5% consumption of iron and Vit. Low C, 86.8% good physical fitness. Pearson product moment analysis results showed no relationship between consumption of iron, vit. C with physical fitness
WHO	Adolescent nutrition: a review of the situation in selected South-East Asian countries	International	2006	The systematic review aims to identify nutritional problems and equate strategic interventions, as well as complement the small nutritional status data of young women	There is a relationship between fetal malnutrition and increased risk of various chronic diseases during adulthood, anemia has a negative impact on the growth and development of adolescents.
Kariadi	The effect of iron supplementation in anemic young women on growth and physical fitness levels	Indonesia	2000	Randomized controlled trial, double blind with placebo control group. Supplements were given for 12 weeks to anemic adolescent girls. Hb levels were examined in 423 female students, randomly divided into 2 groups: female students were given a 3 mg supplement and placebo in capsule form. Then measured BB, TB, physical fitness index with the Harvard steptest	Weekly supplementation of anemic young women increases Hb levels and physical fitness index

related to activity on physical fitness include; Sports activity (Boosen, 2022), frequency of physical exercise and physical injury (Zhang 2022), physical education learning factors (Santoso 2021), physical exercise such as aerobics (Pompano and Haas 2017), anxiety level (Alamsyah, Hestiningsih et al. 2017), energy intake and KH (Murbawani and Firiana 2017) and percent body fat (Hardiansyah, Alamsah et al. 2023) and (Murbawani and Firiana 2017).

Hemoglobin (Hb) level is the second factor which has also been shown to be significantly related to physical fitness. In the latest research by (Hardiansyah, Alamsah et al. 2023) and (Sitoayu, Yuslaili et al. 2020), and was researched by (Sukmajati, Sarbini et al. 2015). The three results of these studies prove that there is a relationship between hemoglobin levels and adolescent physical fitness. Low levels of hemoglobin in the blood are caused

by a lack of iron intake. There are 2 (two) research results that have proven that there is a relationship between iron intake and physical fitness, namely in 2020 by (Sitoayu, Yuslaili et al. 2020) and (Sukmajati, Sarbini et al. 2015). If iron intake is lacking, the role of iron which functions to increase serum ferritin is insufficient to meet the needs of iron metabolism if it occurs in individuals who have high physical activity such as frequent aerobic exercise (Pompano and Haas 2017). In individuals who are prone to iron deficiency in the body as a result of high physical activity and also the routine regeneration of red blood cells due to menstruation in women, it is necessary to supplement iron to prevent iron deficiency for iron metabolism and also to prevent low hemoglobin levels in the body. blood which is often called Anemia.

The relationship of anemia to body fitness has been proven by (Retnaningtyas, Muwakhidah et al. 2014) and it has been explained that the impact of anemia on adolescents is related to malnutrition in the fetus and an increased risk of various chronic diseases during adulthood and the occurrence of developmental and growth disorders in adolescents (Organization 2006). In an effort to prevent the occurrence of anemia in adolescents, especially young women who are very at risk of anemia caused by menstruation every month, in 2014 the government implemented a program of giving iron tablets to young women at school.

A researcher (KARIADI 2000) conducted a study on the effect of iron (fe) supplementation on physical fitness in young women for 12 weeks. The results have proven that supplementation of iron tablets can provide benefits in addition to preventing anemia as well as increasing physical fitness in young women. After 20 (twenty) years later, (Ramadhon, Rahfiluddin et al. 2020) researchers conducted another study on the relationship between consumption of iron (Fe) tablets and the physical fitness of young girls at school who have routinely carried out the program of giving Iron Supplement Tablets from the government. It is unfortunate that the results of (Ramadhon, Rahfiluddin et al. 2020) research have not been able to prove the relationship between the two. The difference in research results is probably due to the smaller number of samples in Romadhon's study (67 samples) compared to Kariadi's study of 423 samples. However, the advantage for Romadhon is that the administration of Blood Supplement Tablets has been running since 2014 until now which allows the effect of the supplementation that has been given since before the study to be seen with the parameters of the Physical Fitness Test. This raises a question, how successful is the Iron Supplement Tablets administration program in schools so far? and can physical fitness in young women be used as a parameter for the success of the program for administering Iron Supplement Tablets which is cheaper and easier to do than taking serum ferritin? The Physical Fitness Test can also be carried out by all groups, be it School Health teachers (School Health Enterprises), Sports Teachers or health workers from the Community Health Center (Pusat Kesehatan Masyarakat). The importance of monitoring physical fitness during the current post-pandemic period to increase individual body resistance from various diseases (Santoso 2021).

Figure 2. Young girl taking iron tablets (TTD) at school

Other factors related to physical fitness and have been proven by several studies, namely; there is a role for zinc on physical fitness (McClung 2019), there is a relationship between nutritional status and physical fitness (Alamsyah, Hestiningsih et al. 2017) and (Iryanti, Rustiningsih et al. 2015) and there is a relationship between body composition and physical fitness in adolescents (Sukmajati, Sarbini et al. 2015).

CONCLUSION

From the results of a literature review taken from the search engines Googgle Scholar and Pubmed, seventeen research journals were found which had proven the relationship of several factors to the physical fitness of young girls. And there are 4 (four) main factors that have been proven significant several times and were re-examined by this new researcher, these factors include; 1. Physical activity, 2. Hemoglobin levels, 3. Iron intake, and Anemia. Of these four factors, there are 3 (three) related to the Iron Supplement Tablets Program at school. The Iron Supplement Tablets administration program is a supplementation program for Fe (60 mg) and 400 mcg Folic Acid which has not been proven to have a relationship with physical fitness.

Suggestion

The author provides suggestions for further research with similar or different research designs so that it can prove whether Iron Supplement Tablets in young girls at school can provide additional benefits, namely increasing physical fitness as well as preventing anemia.

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