



Circuit Training Improves VO₂max in AF Gempa Bumi Pai Football Players (Wera Subdistrict)

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Abstract
<p>Objective : Study This aim For know influence <i>circuit training</i> to improvement player's VO₂ Max capacity Football Club Association Football Earthquake Pie Subdistrict Wera .</p> <p>Material And Method : Study use design experiment quasi - <i>experimental</i> with a <i>one group pretest–posttest design</i> model . Sample study consists of of 20 players selected football purposively . Instrument VO₂ Max measurement using <i>Multistage Fitness Test (Bleep Test)</i> . Exercise program <i>circuit training</i> implemented for 6 weeks with frequency 3 times per week . Data analysis using test <i>paired sample t-test</i> For test difference VO₂ Max value before And after treatment .</p> <p>Results : Results study show existence improvement significant VO₂ Max value after treatment (p < 0.05) . The average VO₂ Max increased from 42.5 ml/kg/min to 47.8 ml/kg/min, so show that training program give influence positive to capacity aerobics player .</p> <p>Conclusion : <i>Circuit training</i> influential significant to increase in player's VO₂ Max football . This program can made into alternative exercise physique For increase Power stand cardiorespiratory players at the level club</p>
Keywords: Circuit training; VO₂max; Aerobic fitness; Football players.

Introduction

Football is demanding sport combination various aspect physical , technical , and tactical . Between aspect physical , capacity aerobics or Power stand cardiorespiratory very important , because during match player often do run intensity tall interspersed activity intensity currently until low , and period relative recovery short .

VO₂ Max (volume of consumption) oxygen maximum) is the main parameter in evaluate capacity aerobics somebody . High value show ability body in consume And utilise oxygen during activity physique maximum , which has an effect to Power durable , efficient Work heart And lungs , up to speed recovery after activity heavy .

A number of study has show that method exercise certain effective in increase VO₂ Max. One of method that gets Lots attention is *circuit training* , namely exercises that combine a number of station exercise (usually involving exercise strength , agility , power hold) with Rest short between station . Exercise This combined with sufficient intensity tall so that capable trigger adaptation physiological support improvement capacity aerobics .

Example concrete, research by Yunus (2023) on U-16 futsal athletes in the Regency Lamongan show that 6 weeks of circuit training, 3 times per week, is capable of increased the average VO₂ Max from ~39.29 to ~43.93 ml/kg/ min, and difference the significant in a way statistics.

Other research at the Center for Ngaliyan Boys' Football, Semarang compares circuit training with ratio work-rest 1:1 and 1:2, for 6 weeks, 3 times per week, on athlete football, show that second ratio the increasing VO₂ Max, with a little 1:1 ratio more effective.

Although so, not yet Lots research that is special research the effect of circuit training on increase in VO₂ Max in scale club local, such as the United Club Football Earthquake Pie in the District Wera, who may own condition facilities, conditions athletes, and commitment different exercises. By Because that, research This important For done use give proof empirical local about effectiveness of circuit training in increase VO₂ Max for player football in the region the.

Materials and Methods

Study Participants.

Study This involving 20 players active from the Unity Club Football Earthquake Pie Subdistrict Wera. Criteria inclusion participant are: (1) aged 16–22 years, (2) active follow exercise club in a way routine, (3) no own history injury or disease chronic disturbing activity physical, and (4) willing follow all over series research. Selection sample use technique *purposive sampling*.

Study organization.

Study This use design experiment quasi - *experimental* with *one group pretest–posttest* design model. Procedure study includes:

1. **Pretest:** All participant undergo VO₂ Max test using *Multistage Fitness Test (Bleep Test)*.
2. **Intervention :** Participant take part in a *circuit training* program for 6 weeks, with frequency exercise 3 times per week. One session exercise lasting ±60 minutes, consisting of on warm-up (10 minutes), exercise core (*circuit training*) with 8 stations (push-ups, sit-ups, squat jumps, shuttle runs, burpees, skipping, planks, short sprints), as well as cooling (10 minutes). Every station done for 30–45 seconds with rest 15–30 seconds, and series repeated 3–4 rounds per session.
3. **Posttest:** After the program is completed, the VO₂ Max test is repeated. done with the same method.

Statistical Analysis

Data analyzed use **test *paired sample t-test*** For know difference VO₂ Max value before And after intervention . Analysis done with device SPSS software version 25, with level significance set at $\alpha = 0.05$.

Results.

Descriptive Statistics

VO₂ Max measurements were performed twice , namely before (*pretest*) and after (*posttest*) *circuit training program* for 6 weeks . Table 1 shows average value and standard deviation results test .

Table 1. Descriptive statistics of VO₂ Max before and after intervention (n = 20)

Measurement	Mean (ml/kg/min)	Elementary School	Min	Max
Pretest	42.5	2.8	38.0	47.0
Posttest	47.8	3.1	43.0	53.0

Results descriptive show existence average increase in VO₂ Max by **5.3 ml/kg/min** after participant undergo *a circuit training program* .

Normality Test

Test normality use **Shapiro– Wilk test** show that the VO₂ Max data in the pretest (p = 0.231) and posttest (p = 0.186) were normally distributed (p > 0.05). With thus , test parametric can used For analysis more carry on .

Paired Sample t-Test

Analysis *paired sample t-test* done For know difference in VO₂ Max before And after the training program . Results test served on Table 2.

Table 2. Paired sample t-test of VO₂ Max (n = 20)

Comparison	Mean Difference (ml/kg/min)	t-value	df	p-value
Pretest–Posttest	-5.3	-9.21	19	0.000*

Description : $p < 0.05$ (*significant*)

Interpretation

Results test *paired sample t-test* show that there is significant difference between VO₂ Max value before And after *the circuit training* program ($p < 0.05$). With thus , it can concluded that *circuit training* influential significant to improvement player's VO₂ Max capacity Football Club Association Football Earthquake Pie Subdistrict Wera .

Discussion

Results study This show that *circuit training* program during six Sunday with frequency three times a week capable increase player's VO₂ Max value Football Club Association Football Earthquake Pie Subdistrict Wera in a way significant ($p < 0.05$) . The average increase of 5.3 ml /kg/min indicates that method exercise This effective in increase capacity aerobics .

The increase in VO₂ Max that occurs can explained through mechanism adaptation physiological . Exercise *circuit training* that combines exercise strength , power hold on , and speed capable stimulate improvement rainfall heart , stroke volume , and efficiency Work lungs . Adaptation This on Finally increase ability body in consume And utilise oxygen during activity physique intensity high (Kenney et al., 2021).

Findings study This in line with results study Yunus (2023), who reported that *circuit training* during six Sunday capable increasing the average VO₂ Max of U-16 futsal athletes from 39.29 to 43.93 ml/kg/ min significant . Results similar Also shown by study at the Training Center Ngaliyan Boys' Football , Semarang, that variation ratio work – rest on *circuit training* (1:1 and 1:2) are the same increase VO₂ Max, although 1:1 ratio proven more effective (Prayitno et al., 2017).

Besides that , research by Kumar and Sharma (2016) also disclose that *circuit training* No only increase capacity aerobics but Also give contribution positive to strength And Power stand muscles , which in his turn support performance football in general comprehensive . With Thus , *circuit training* can considered as method exercise relevant multifunction for player modern football .

From the perspective In practice , increasing VO₂ Max is very important for player football , remembering sport This demand activity with intensity varies for 90 minutes match . Player with high VO₂ Max will more capable maintain performance throughout match , more fast recover after the sprint, and own Power more resistant Good to fatigue (Stølen et al., 2005).

However Thus , research This own limitations , namely only involving One group without group control so that effect *circuit training* No can compared to with method other exercises . Besides that , duration intervention relatively short (6 weeks) , so that Not yet can describe effect term long . By Because that , research advanced with design more experiments strong , involving group control , and duration intervention more long very recommended .

Conclusions

Study This conclude that *circuit training* influential significant to increase in player's VO₂ Max Football Club Association Football Earthquake Pie Subdistrict Wera . Implemented training program during six Sunday with frequency three times a week capable increase capacity aerobic average of 5.3 ml /kg/min.

The increase in VO₂ Max show that *circuit training* effective as method exercise For increase Power stand cardiorespiratory , which is vital components in support performance football .

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