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Effect of endurance exercise on nrf2 mRNA expression gene and physical fitness (VO_{2max}) of Indonesian Hajj Health Officers

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1. Background

Indonesian Hajj Health Officers are health workers assigned by the Minister of Health of the Republic of Indonesia to provide services, guidance, and health protection to pilgrims during the Hajj pilgrimage, not it is only sufficient to have work competence in terms of knowledge, skills and work attitudes that are in accordance with established standards, but it is highly demanded to have excellent physical endurance. An Indonesian Hajj Health Officer is required to have 3 (three) abilities in carrying out his duties and responsibilities in the health sector, namely (a) managerial ability, (b) skill ability and (c) excellent physical ability. Excellent physical ability is one of the main keys to success in providing health services to Indonesian Hajj pilgrims, this is possible because the number of Indonesian Hajj pilgrims is very large and the length of time serving Indonesian Hajj Health Officers for approximately 39 days for TKHI and 76 days for PPIH. The physical fitness of a Hajj Health Officer is required in addition to being in general fitness, they must also be demanded for specific physical fitness. Standardization of individual physical fitness in general can be measured by the $VO_{2\max}$ level is one of the markers of physical fitness and an increase in $VO_{2\max}$. Regular exercise can increase of $VO_{2\max}$ levels. So the higher one's $VO_{2\max}$, also has good endurance. Endurance exercise consists of two groups, namely endurance cardio respiration (general) and muscle endurance (local). For measurement of cardiorespiratory endurance by $VO_{2\max}$. Some of the results of research in the field biomolecular of genetic markers for endurance, one of which is the nrf2 gene, also known as GA-binding protein transcription factor β sub unit (GABPB1), which is a transcription factor in mitochondrial biogenesis. Mitochondrial Biogenesis and nucleus expressed by one of the nrf2 mRNA genes encoded by the GABPB1 gene, located on chromosome 15q212.

2. Objectives

The aim of the research was to examine the effects of Endurance Exercise on the Expression of the mRNA Nrf2 gene and Level of $VO_{2\max}$ of Indonesian Hajj Health Officers.

3. Methods

This study was a single group quasy experiment that took place in two locations the Makassar Health Training Center and Makassar Haji Sudiang Dormitory.

3.1 Participant

Participants are Prospective Indonesian Hajj Health Officers as many as 30 participants consisting of 17 men and 13 women. Criteria for inclusion of participants include: (a) Participants from the Nurse profession aged 30 - 39 years (b) Pass the selection of candidates for Indonesian Hajj Health Officers (c) Understand the physical training program instructions in the rockport method (d) willing to participate in activities and all research provisions . Participants who (a) had a history of coronary heart disease, asthma; (b) not approved by the doctor to participate in the study due to a medical condition, excluded from the study.

3.2 Desain and measure

3.2.1 Exercise Protocol

Subject ($n = 30$), measured $VO_{2\max}$ level 3 times using the Multistage Fitness technique Test (MFT) Bleep Test method (level and feedback) before and after the 1600 meter running exercise duration 20-30 minutes 3 times a week with a frequency of exercise 16 times, then measuring $VO_{2\max}$, 1 week after exercise without running intervention.

3.2.2 VO_{2max} Measurement

Level value and feedback from the Bleep test, then the value is converted into the VO_{2max} based on the level achievement and feedback obtained, then the VO_{2max} value is grouped into the form of levels including special, excellent, good, moderate, less and very less.

3.2.3 Measurement of mRNA NRF2 Gene Expression

RT-PCR analyzes human RNA in the nrf2 RNA sample as the target gene and GAPDH is selected as the housekeeping gene. Samples were preserved in nuclease free water (Norgen biotech, Inc.), and RNA was extracted using the RNA isolation kit "RNAPrep pure kit for blood" (Tiangen Biotech, Beijing). cDNA is cleaned using the "iScript cDNA synthesis kit" (Bio-Rad Laboratories, Inc.) cDNA kit and store at -20°C until analyzed by RT-PCR. RT-PCR is run on CFX96 touch (Bio-Rad Laboratories, Inc.) using the QPCR master mix "Ssofastevagreen supermix" (Bio-Rad Laboratories, Inc.). Specific gene primer pairs are described as follows:

Forward: GAGAGCCCAGTCTTCATTGC;

Reverse NRF2 Primary: TTGGCTTCTGGACTTGGAAC.

3.3 Statistical Analysis Method

Statistical analysis using SPSS Software (version 21. Inc. Chicago, IL USA) Wilcoxon sign rank test was used to prove the effects of endurance exercise on nrf2 mRNA expression gene and VO_{2max}. Linear regression test and Spearman Rank to analyze the correlation of the nrf2 gene mRNA with VO_{2max} and the Mann Whitney test to prove changes in retention VO_{2max}.