



Role of Physical Exercise in Chronic inflammation

Rola aktywności fizycznej w przewlekłym zapaleniu

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A – koncepcja i przygotowanie projektu badań, B – wykonanie analiz diagnostycznych, zbieranie danych, C – analiza statystyczna, D – interpretacja danych, E – przygotowanie manuskryptu, F – opracowanie piśmiennictwa, G – pozyskanie funduszy.

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SUMMARY

Background. We review and analyzed the relationship between physical exercise and inflammatory disease (ID), its covers a group of chronic disease (CD), As relapsing and remitting intestinal disorders. Researches were focused on this search we encountered the cytokine interleukin, IL-6 As a better marker among some markers, It is produced by contracting muscles and released into the blood, and we propose that muscle-derived IL-6 meets the criteria of an exercise factor and that such classes of cytokine.

Objective. The aim of this work to update on physical, exercise affects experimental models.

Material and Methods. Patient (N=73) a human as age, Mean±S.D (59.3±9.8) ys, with Chronic inflammation disease in Iraq, from (May 2014 - October 2015). This study was the Ethics Committee patients and control samples carried out in Baghdad, Diyala and Erbil Hospitals. The diagnosis of inflammation disease with different modes of exercise and the corresponding increase in plasma IL-6 levels.

Results. IL-6 levels was high in patients after exercise (83±1.02) ug/ml, IL-6 levels while was lower in patients control without or before exercise (7.75±2,11) ug/ml.

Conclusions. A data indicate IL-6- regulated an acute-phase proteins as anti-inflammatory and a marked increase in circulating levels IL-6, after exercise without muscle damage is a remarkably consistent finding.

Key words: Exercise, Chronic inflammation, IL-6.

STRESZCZENIE

Wstęp. Dokonano przeglądu badań dotyczących związku między ćwiczeniami fizycznymi a chorobą zapalną (ang. inflammatory disease, ID), chorobami o charakterze przewlekłym (ang. chronic diseases, CD) – nawracająco-zwalniającymi schorzeniami jelit. Następnie, zgromadzone wyniki poddano analizie. W toku powyższych działań skupiono się przede wszystkim na cytokinie zwanej interleukiną 6 (IL-6), będącej lepszym wskaźnikiem laboratoryjnym. Interleukinę wytwarzają kurczące się mięśnie, po czym przedostaje się ona do krwiobiegu, stąd też zakładamy, iż wśród klasy cytokin pochodząca z mięśni IL-6 spełnia kryterium czynnika związanego z ćwiczeniami fizycznymi.

Cel pracy. Celem niniejszej pracy jest poszerzenie wiedzy dotyczącej wpływu ćwiczeń fizycznych na modele eksperymentalne.

Material i metody. Osoby badane (N=73) były w średnim wieku X=59,3 lat (z odchyleniem standardowym SD=9,8). Znajdowały się one na terytorium Iraku (między majem 2014r., a październikiem 2015r.) i chorowały na przewlekłą chorobę zapalną (ang. chronic inflammation disease). Byli to pacjenci Komisji Etycznej UE. Próbkę kontrolną pochodzą ze szpitali w Bagdadzie i Dijali i Irbilu. Chorobę zapalną diagnozowano podczas różnych typów ćwiczeń, podczas których obserwowany podobny wzrost poziomu IL-6 w osoczu.

Wyniki. Wysoki poziom tej cytokiny obserwowano po ćwiczeniach (X=83, SD=1,02) ug/ml, natomiast niski – przed ćwiczeniami bądź przy ich zaniechaniu (X=7,75, SD=2,11) ug/ml.

Wnioski. Zebrane dane pozwalają stwierdzić, że u badanych IL-6 regulował białka fazy ostrej, mających właściwości antyzapalne. Zaobserwowano również znaczące zbieżności w odnotowywanym, istotnym wzroście poziomu IL-6 we krwi po ćwiczeniach, bez uszkodzeń mięśni.

Słowa kluczowe: ćwiczenia, przewlekła choroba zapalna, IL-6.

INTRODUCTION

Our understanding the role of exercise in diseases has undergone important changes during the past three decades patients with chronic inflammatory disease of joints or muscles were advised to rest rather than to stay active. In the beneficial effects of exercise (physical and training) in patients with rheumatoid arthritis, exercise was demonstrated to improve physical performance, muscle strength and cardiorespiratory fitness without worsening joint inflammation in patients, many studies have demonstrated that different types of physical exercise have a clinically meaningful effect on both the cartilage and of muscle patients [1,2,3]. Chronic and other inflammation play a central role of the pathology of many diseases, such as bowel inflammatory, rheumatoid massive infiltration of inflammatory cells at the site of disease activity and the local presence of inflammatory as well as their abundance in the systemic circulation [4,5]. The chronic diseases are the major cause of death worldwide, all lead by cardiovascular disease (17 million deaths/year) and cancer (7 million deaths/year) chronic lung diseases (4 million deaths/year), and diabetes mellitus (more than 1million deaths/year). Diseases are expected to account for 70% of deaths, 60% disease burden by 2020 [6,7].

IL-6 is pleiotropic cytokine is produced at local tissue sites and released into circulation in almost situations of homeostatic perturbation typically including endotoxemia, endotoxic lung, trauma, and an acute infections. Its critical participation of the generation immunity against and chronic intracellular infections, the circulating of IL-6, together with an alarm cytokines a IL-1, Is known be required for the induction of an acute phase reactions of fever, corticosterone, and hepatic production the acute proteins and more which are protease inhibitor. Actually; the induction by IL-6 of acute phase reactions has been regarded as a part of attempt to maintain homeostasis phases [8].

It not clear understand contracting skeletal muscles of the numerous, diverse metabolic, and Physiological conditions and effects that are beneficial for health [6]. Studies pointed to the relationship between hard exercise and blood plasma endorphin that produced and conflicting results. Some indicate a significant increase of endorphins during or after exercises [9]. A another studies established condition known as exercise defines exercise as an addiction, Characterized by compulsion to the exercise excessively till when the consequences are harmful to individual's health, and family relationships, and personal wealth [10,11,12]. Individuals labeled as exercise-dependent show similar behaviors and hormone levels to those with alcoholism and drug addictions and if exercise increases endorphin levels, few studies have been performed to measure whether this increase plays a role in exercise dependence [13].

Muscle-derived IL-6

IL-6 is most often classified as a pro-inflammatory cytokine, although also indicate the IL-6 regulated acute phase proteins, are anti-inflammatory and immune again and as negatively regulate the acute phase response [14,15]. Growing cardiovascular diseases to a state of a chronic inflammation and it has been suggested IL-6, promotes insulin resistance because of the observation the plasma levels IL-6 often elevated in patients with a metabolic disease. However, IL-6 rapidly released in case a circulation exercise [16]. When myocardial cells, they act break up and release their contents. Various cardiac enzymes rise with a few hours of symptoms and remain elevated for a 1-2 h. The symptoms of heart disease as myocardial infraction include irregular breathing and pain in left chest, Physicians use enzyme analysis to diagnosis and treatment disease. The blood levels of phosphokinase CPK, Aspartate transaminase AST, Troponin, and lactate dehydrogenase LDH used as a markers in same cases [17].

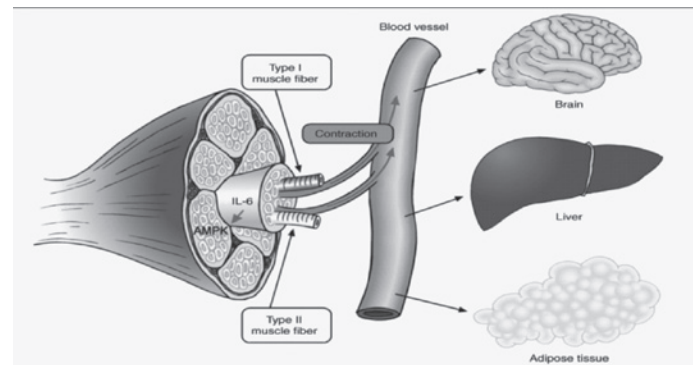


Figure 1. Skeletal muscle is an endocrine organ. Skeletal muscle expresses and releases myokines into the circulation.

In response to muscle contractions, in muscle fibers express the myokine IL-6 [6].

The concept of exercise and training cover heterogeneous in a differ in type (resistance training, acute versus chronic exercise), frequency, intensity, and duration. Structured training exercise it could consist of aerobic exercise and resistance training or both. In contrast to exercise training, physical activity, is defined as any bodily movement produced by skeletal muscle contractions resulting in increased energy expenditure [18]. Exercise also exited production the IL-6 receptor in human skeletal muscle to receive. This effect most appear after the exercise, and which indicates a post-exercise sensitizing mechanism of IL-6 action when a plasma IL-6 is be a low. It is experiments in both animals and humans indicate that the an exercise induced accumulation of IL-6 receptor is independent of increase in IL-6 level [19]. Inflammation was a first recognized as a possible cause of a muscle atrophy. The conditions associated with elevated circulatory levels of pro-inflammatory a cytokines, as IL-1 and IL-6.

Although a direct mechanism for the action of cytokines, it is clear the loss of lean body mass by an affecting multiple organs. There are 4 different systems involved in the skeletal muscle atrophy. Heart vascular disease (CVD) the cause of myocardial infarction as a heart attack (stroke), and unstable ischemic heart pain. Collectively, these diseases account for the leading cause of death in the world [20,21].

The study aims to identify the importance of exercise and secretion of Immune interleukins as (IL-6) in the treatment of inflammatory diseases.

MATERIALS AND METHODS

1. Subjects and materials

Seventy three patient a human as age (59.3±9.8) ys, Seventy three patients with Chronic inflammation disease (CID). Study was in Iraq, from May2014-October 2015. This study was the Ethics Committee patients and control samples carried out in Baghdad, Diyala and Erbil Hospitals-Iraq. The diagnosis of inflammation disease was based on the diagnostic criteria of American Psychological Association [19].Different modes of exercise and the corresponding increase in plasma IL-6 levels. Graph is based on 5 exercise trials and represents 73 subjects.

Sampling and process

Blood samples were a drawn through antecubita venipuncture shortly after awakening in the second night, between 63h and 73h, blood centrifuged for 20 min at1000 x g, the serum was aspirated and frozen at -80C.The samples was assayed and Quantified by a high-sensitivity immunoassay on a BN-100 nephelometer (Dade-Behring, Deerfield, IL, USA). This assay has a sensitivity of 0.175 mg/l. IL-6 was measured simultaneously using a commercially available immunoassay (Linco Research, St. Louis, MO, USA) on a Luminex 100 (Luminex Corp., Austin, TX, USA). We another demographics and medical characteristics and Questions for patients as Table [1].

All values were expressed as means ±SDS and the data were analyzed by using of computer SPSS statistical program.

demographics and medical characteristics	
Variable (N=73)	Mean±S.D.or%
Age, years	59.3±9.8
Female gender	40.9%
Body mass index	29.7±5.9
Diabetes	29.6%
History of hypertension	65.9%
History of smoking	65.9%
Hypercholesterolemia	81.8%
History of myocardial infarction	59.1%
History of congestive heart failure	20.5%

RESULTS

Levels of plasma IL-6 at different stages are presented in Tables (1,2). Plasma levels of IL-6 were higher during ID with the exercise, compared to (p ≤0.001), and increased considerably during at 24 hours after the exercise. Exercise in the pre-illness Period. [22]. Muscle-derived IL-6: the first myokine IL-6 is most often classified as a pro-inflammatory cytokine, although data also indicate that IL-6 and IL-6-regulated acute-phase proteins are anti-inflammatory and A marked increase in circulating levels of IL-6 after exercise without muscle damage is a remarkably consistent finding. For a review of the IL-6 response to exercise (Figure1,2). The level of circulating IL-6 increases in an exponential fashion in response to exercise, and declines in the post-exercise period.

Table 1. Mean±SD of Plasma levels of IL-6 in group (Inflammation disease) (ID) before exercise.

Type of exercise	n=73	
	Plasma levels of IL-6	P .value
	Mean ± SD	
Knee extensor	10±1.42	0.0001
Bicycling	5±2.2	0.0000
Running	12±11.0	0.66
Eccentric	4±23.1	0.070

Table 2. Mean±SD of Plasma levels of IL-6 in group (Inflammation disease) (ID). Patients (group) after exercise.

Type of exercise	n=73	
	Plasma levels of IL-6	P .value
	Mean ± SD	
Knee extensor	40±2.78	0.0001
Bicycling	45±1.15	0.0000
Running	150±10.1	0.66
Eccentric	100±3.18	0.070

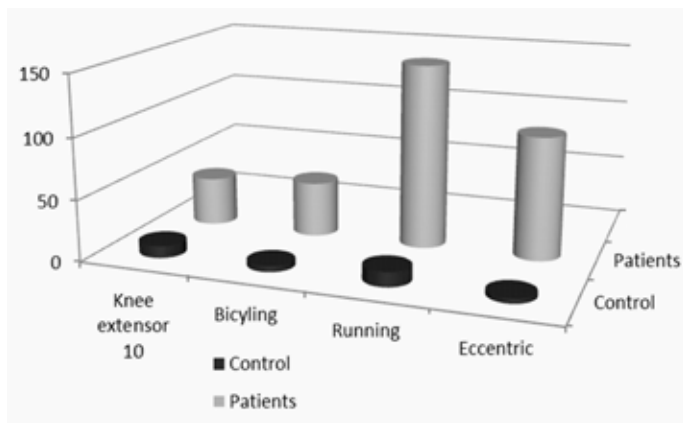


Figure 1. IL-6 in control and patient.

DISCUSSION

We used IL-6 as a marker because its considered important among a three biological factors tumor necrosis factor- α (TNF- α), (C-reactive protein (CRP) and coagulation(fibrinogen), that are thought play an important roles in cardiac morbidity and mortality cases and have been associated with chronic inflammations disease, So pro-inflammatory processes, procoagulant processes, and altered cardiac autonomic nervous system (ANS) function related with it [8].The observations support the notion a variety of environmental factors contribute to the pathogenesis of diseases [22].In developed countries ,the peoples' lifestyle considered has changed significantly and affected by serious modifications in dietary habits and physical in activities [23]. Changes in lifestyle may have bearing on course of the disease; Some studies examined the effect of lifestyle, particularly physical activity as supposed by causal agents for inflammation disease by Sonnen berg [24]. The occupations characterized by physical work appeared to be protective compared with occupations classified as two groups (n=73) case-control [25]. Determined that ID patients (n=73) had lower levels of physical activity during their pre-illness period than clinic controls (n= 73) , (p<0.001). ID patients had lower levels of physical activity during their pre-illness period compared to clinic but not population controls. By Cucino and Sonnenberg [26]. Examined the occupations of the ID mortalities between 1991 to 1996 in 2399 cardiac disease (CD) and 2419 patients in USA and found that ID mortality was low in occupations associated with manual work as relatively high in sedentary occupations. Halfvarson et al [27]. Studies environmental factors in the population based the Cardiac heart disease (CHD) sufferers. Counseled to rest and avoid exercise in order to delay disease progression. Studies documenting the benefits of exercise for patients are fewer than those demonstrating its benefits for coronary artery disease patients; it has been found that most CHD patients who exercise can significantly improve the functional status and quality of lifestyles. Regular exercise is including aerobic as well as training, also

reduce the risk of death for cardiac heart disease patients, supplementation with several nutritional factors, including a marked impact on reducing the severity and progression of CHD.As well, synthesize pro-inflammatory and anti-inflammatory cytokines and could play a role as a barrier to the inflammatory process, but recent data suggest that deregulation of adipokine secretion is involved in the pathogenesis of chronic disease (CD).Contracting skeletal muscles release biologically active myokines, known to exert the direct anti-inflammatory effects, and inhibit the release of pro-inflammatory mediators. Further research is required to confirm these observations and establish exercise regimes for inflammation disease (ID) patients.

CONCLUSIONS

Various forms of the inflammations disease as coronary artery disease and another are regulated with exercise practice according to response muscles to excretion the IL-6.

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