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Systematic Review

Health Benefits and Consequences Associated with Uric Acid Among Exercise Performers

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ABSTRACT

Uric acid (UA) is a waste product formed when chemicals called purines break down. UA perform various functions such as a stimulant of the immune system, urate is an effective antioxidant, maintains blood pressure in a salt-poor environment and works against certain health diseases of the nervous system due to its antioxidant properties. Being an important biochemical agent, people do not give much importance due to insufficient knowledge about UA. This review study was initiated to assess the benefits and consequences associated with UA among exercise performers. One hundred (100) articles were placid into two (02) categories, i.e. (a) articles about health benefits of exercise and complication or penalties of UA (b) articles about the linkage or association of UA and Exercise. Moreover, the study was limited to the primary two magnitudes of UA, i.e. health benefits and consequences or risks of UA and Association of UA and Exercise. A literature search was done based on predefined keywords of the study. Finally, two (02) foremost search sources were used for assembling pertinent literature, and thus thirty-three (34) research articles were entertained per the study's recommended criteria. The categorization of studies grounded on quality and quantity was based on the established standards of the current review study. The existing literature disclosed that different managerial strategies such as eating low-purine foods, eluding certain medications, conserving a moderate weight, evading alcohol and sugary drinks, drinking coffee, increasing vitamin C intake, eating cherries and execution of low or moderate-intensity exercise have a significant effect on UA concentration.

INTRODUCTION

UA is a typical waste product molded when chemicals called purines break down [1]. Purines are natural substances create in the body and various foods like alcohol, shellfish, and liver. It is similarly shaped when DNA breaks down [2]. Metabolism of purine includes the breakdown of Adenosine triphosphate (ATP) to adenosine diphosphates (ADP), Adenosine monophosphate (AMP), Inosine monophosphates (IMP), and inosine [3]. When purines are broken apart into UA in the blood, the body gets free of it when a person urinates or has a bowel activity [4]. The normal ranges for UA in the bloodstream are as follows; Adult female: 2.7-7.3 mg/dL or 0.16-0.43 mmol/L, Adult male: 4.0-8.5 mg/dL or 0.24-0.51 mmol/L Elderly: A slight increase in values may occur, Child: 2.5-5.5 mg/dL or 0.12-0.32 mmol/L and Newborn: 2.0-6.2 mg/dL [5]. The body makes too much UA if the kidneys are not working properly [6]. The UA level also increased due to overeating purine-rich foods or taking medicines like aspirin, diuretics, and niacin [7]. Then UA crystals can precipitate and accumulate within the joints. This results the painful inflammation. This state is called gout. It may also lead to kidney stones [7, 8]. UA is a heterocyclic (A heterocyclic compound or ring structure is a cyclic compound) that has atoms of at least two different elements as members of its ring(s) [9] compound of carbon, nitrogen, oxygen, and hydrogen with the formula C5H4N4O3 [10,11]. The structural formula of UA is shown in figure 1.

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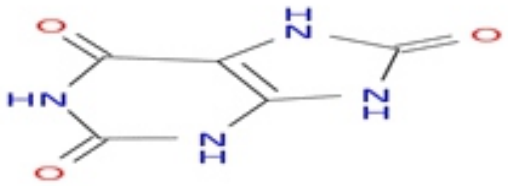

Figure 1: Structural Formula of UA

UA play a vital part as a stimulant of the immune system. It also has antioxidant potential that helps uphold blood pressure in a salt-poor situation and helps in eluding diseases of the central nervous system due to its antioxidant capacity [11, 14]. Exercise has a significant impact on living organisms with gout. Research indicates that exercise not only decreases UA but also improves the lifespan of 4 to 6 years among those who have elevated levels of UA. Being overweight may cause a dramatic increase in UA and thus regular exercise may decrease the level of UA. Overweight people are always at risk of different health risks such as high blood pressure, chronic disease and chronic pain in muscles and bones [6,7].

After a critical analysis of the above previous studies, now it is clear to say that UA is the most important biochemical parameter of the study and plays a key role in the maintenance and promotion of different physiological activities of the body. What role is played by UA with context to exercise and body, this particular research study was initiated to analyze the previous studies for the assessment of health benefits and consequences associated with uric acid among exercise performers.

METHODS

Keeping in view the importance of UA with special reference to health benefits and consequences, particularly among exercise performers as indicated by the overhead studies, one hundred (100) articles were placid into two (02) categories, i.e. (a) articles about health benefits of exercise and complication or penalties of UA (b) articles about the linkage or association of UA and Exercise. Moreover, the study was limited to the primary two magnitudes of UA, i.e. health benefits and consequences or risks of UA and Association of UA and Exercise. A literature search was done based on predefined keywords of the study. Finally, two (02) foremost search sources were used for assembling pertinent literature, and thus thirty-three (34) research articles were entertained per the study's recommended criteria. The categorization of studies grounded on quality and quantity was based on the established standards of the current review study.

RESULTS

Various factors cause low or low levels of UA are; Fanconi syndrome (Fanconi syndrome is the state of the kidney to reabsorb nutrients such as minerals which the need for its normal functions and similarly the main symptoms of this state of the body are peeing a lot, drinking more than usual, bone pain and muscle weakness, metabolic disorders associated with heredity diseases, HIV infections, malnutrition and different types of medications [12]. The main factors responsible for elevated UA levels are; drinking too much alcohol and soda, water retention relievers or consuming too much of foods that hold fructose, a type of sugar, genetics, immune-suppressing medications, kidney disorders, leukemia, high blood pressure, niacin, metabolic disorders also named polycythemia vera, psoriasis, obesity, vitamin B-3, a purine-rich diet, high in foods such as game meat, liver, sardines, anchovies and Tumor lysis syndrome — a fast release of cells into the bloodstream resulted by certain cancers or by chemotherapy for those cancers [7,13,14]. Aerobic exercise (AE) is considered advantageous for well-being [15]. Likewise, long-term means high-intensity exercise may cause an imbalance among reactive oxygen species (ROS) and antioxidants [16]. Research shows that AE produced a substantial upsurge in salivary UA concentration. In addition, UA is an end relic of purine metabolism and has been projected to function as the most dynamic antioxidant particle in saliva [17].UA has free-radical-scavenging characteristics, and systemic direction is known to upsurge serum antioxidant capacity. Though, it is not recognized whether this defends against oxidative stress [18]. Association of elevated serum uric acid (SUA) concentration (hyperuricemia) with gout has been recognized likewise elevated SUA has been also considered associated with many coronary heart diseases such as hypertension, stress, and hypercholesterolemia. Despite this conclusion, many studies signpost an advantageous association among physical activity, risk factor alteration, and vulnerability to coronary heart disease. Physical activities have a very positive impact on health by strengthening the immune system and reducing health issues. It also influences the level of SUA as well. Exercise with low to moderate intensity exercise drops SUA levels. Mechanisms for these variations are deliberated as well as inferences concerning coronary disease [19]. Overweight people are mostly at risk of increased UA. Weight control is significantly co-related with the reduction of UA. In addition, In-between to strenuous exercise helps to decrease waist circumference and SUA. In the hyperuricemia (high level of UA) population, overweight, middle-aged men were the most pretentious, and also the most probable to do more exercises and get their body weight back to normal [20]. Increased UA levels are rapidly increasing in the general masses [21]. Epidemiological studies have shown that hyperuricemia is

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linked with numerous metabolic syndromes [22]. Alike occurrence has been originated in China [23]. Few research article highlighted that being overweight might be linked with varied metabolic complications [24]. UA due to its antioxidant activity, was thought to safeguard neuronal cells, therefore enabling brain development, and also show a significant role in maintaining blood pressure [25]. However, the antioxidant activity of UA is not as influential as either hydrophilic vitamin C or hydrophobic vitamin E conferring to its chemical structure. The effects caused by the antioxidant activity can be easily relieved by intake of the two vitamins [26] and other foods comprising sinking chemicals [27,28]. Many health consequences are associated with increased level of UA, such as weakness and pain in bones, joints, tendons, ligaments, kidney disease, heart disease, high blood pressure, fatty liver diseases, and fatty liver diseases [29,30,31]. For the management of uric acid, it is important to; eat low-purine foods, avoid certain medications, maintain a moderate weight, evade alcohol and sugary drinks, drink coffee, increase vitamin C intake, eat cherries and perform low or moderate-intensity exercise [32,33].

CONCLUSIONS

Based on the above critical analysis of previous research findings, it is concluded that different managerial strategies such as eating purine-rich foods, avoiding certain medications, maintaining a moderate weight, evading alcohol and sugary drinks, drinking coffee, increasing vitamin C intake, eating cherries and perform low or moderate-intensity exercise has a significant influence on UA concentration. Likewise, the volume and intensity of exercise also matter greatly because exercises such as low-intensity and moderate-intensity exercise have a positive impact on UA concentration as compared to high-intensity exercise.

Authors Contribution

Conceptualization: MIM
Methodology: MIM, ZIB, AK
Formal analysis: MIM, ZIB, AK
Writing-review and editing: MIM, ZIB, AK

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

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