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COMPARISON OF SOME IMMUNE SYSTEM INDICATORS OF ACTIVE ELITE WRESTLERS WITH THE ACTIVE SENIORS

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ABSTRACT

The aim of this study, was to compare the rest levels of some Indicators of immune system (leukocytes and Its subtypes, such as neutrophils, monocytes , limphocytes and immonoglobolin A) of active elite with active senior wrestlers of semnan province . For this purpose, selectively three groups of 20 subjects is as : active elite group with average height of 165 ± 0.05 cm, weight of 64.42 ± 5.73 kg and age of 17 ± 0.74 years , active senior group with average height of 174 ± 0/04 cm , weight of 77.25 ± 6.8 kg , and age of 39.33 ± 3.03 years and the control group (20 persons) with average height of 171 ± 0.05 cm , weight of 71.4 ± 3.86 kg and age of 38.36 ± 2.29 years that they were examined physically and psychologically By a physician . From subjects the blood samples were collected at 9 am simultaneously with fasting in specialized laboratories in city of Damghan. Data analyzed by ANOVA (ANOVA) and for multiple comparisons of means in three groups, Tukey test and T test using SPSS version 17 , in the significance level of $P<0.05$ was done . The research showed that the experimental group 1 due to the nature of wrestling that has too much exercise and had minimal recovery time most significant reduction in white globule and immunoglobulin A was observed. Therefore, the

results showed that the elite group has lower immune resting levels, and based on the results of the present study suggest that athletes should have Adequate rest during exercise, so above index would rises.

Keywords: Wrestling, Active Elite, Active Senior, Leukocyte

INTRODUCTION

Immune system as a tool for recognition of self cells from foreign substances and maintaining homeostasis of the body has evolved. In fact, all immune responses of body against emerging foreign molecules in the immune system occur. The issue that athletes during intense training or sensitive competition, against certain diseases are more talented accepted by elite athletes, coaches and sports doctors. However, the general belief is that regular moderate exercise reduces the risk of infectious diseases like colds. Exercise on immune power against infection, has a double effect. Such a manner that prolonged periods of intense exercise increase infectious disease, and regular and moderate exercise reduces it. Although there is no documentary evidence, but it seems that upper respiratory tract infections in athletes are the most common infectious **[1]**. Many studies on the effect of physical activity on white globules and immunoglobulins have been done, including **[2]** in a study conducted on older athletes showed that light and medium exercise increases IgA levels. In another study by **[3]** Effect of aerobic exercise on older men was done. In this study, concentrations of IgA and IgM were significantly increased in older athletes, but there was no significant difference in the concentration of IgG **[3].** Also, **[4]** showed that the total number of leukocytes and lymphocytes during bike exercise for 60 minutes with 70% of vo2max in boys aged 12 to 14 has increased **[4]**. Tartibian and colleagues (1382) reported that cell immunity and serum cortisol of wrestlers influence under exercises and the immune system will be weakening and inhibiting **[5]**. **[6]** in a study showed that intense physical activity can lead to suppression of IgA and IgM, whereas moderate intensity exercise can strengthen it **[6].** Thus, according to research conducted by different researchers, each have selected specific exercise that have energy system and unique features of its own and also with the discrepancies in the findings, the researchers have chosen wrestling with its own training and a little foreign research selected for study, So study and knowledge of the immune system, in order to plan the duration, intensity and duration of exercise and rest period is

essential for trainers program. Due to the characteristics of wrestling, and anthropometric and body composition characteristics of the wrestlers, study of physiological and immunological variables takes a particular way that is different from other sports **[7]**. However, immunoglobulin A in the primary immunological defense against local infections in areas such as respiratory and digestive system is important , and wrestlers because of body composition changes and impacts of it (weight reduction) or to tolerate certain intensity exercise are needed to evaluate the primary immunological defense, but little research has been reported in this case about wrestlers . Specified that , rapid weight loss that are wrestlers do leads to loss of body fluids, glycogen depletion and degradation of muscle tissue which can be regarded as the major cause of impaired health and athletic performance while reducing immune function will also yield **[8]**. This research is important when considering the weight being in wrestling and discussing weight loss can be very useful. Researchers like **[9, 10]** studied the effect of weight loss on immune system, for example, **[10]** in a study the side effects of energy restriction (weight loss) on changes in immunoglobulins and complement components during periods of weight loss in 49 subjects of judo studied. Athletes had exercise and food restriction and 11 athletes' had dietary restrictions. Changes in anthropometric indices, energy reception, immunoglobulins concentration and serum complement and number of white blood cells were measured at four different times. The results showed that energy restriction alters immune parameters such as immunoglobulin and complement that intensifies in 7 days after competition and increase the risk of infection **[10]**. On the other hand, **[11]** determined that the majority of obese people, obesity is associated with inflammation in adipose tissue and lead to chronic activation of the innate immune system, resulting in insulin resistance, diabetes and, incomplete glucose tolerance **[11]**. Also recently have been shown that adipose tissue is an active ingredient in physiological processes and pathophysiologic that generally obesity is associated with tissue inflammation and increased risk of infection and there are cross-correlation between the immune system, obesity and nutrition type. According to the J-shaped pattern, a long-term severe exercise or long-term strenuous training period increase the risk of upper respiratory tract infection compared to inactive people. Most studies of the validity of the J-shaped pattern the responses of athletes participating in

endurance events have been focused. This does not mean that athletes participating in events like speed or strength less URTI symptoms are reported. In fact, if heavy exercise with insufficient recovery between periods of training is associated, these athletes will be faced with the risk of URTI than endurance athletes [**2].** Whereas, to achieve the desired weight (increase or decrease in weight) and also heavy exercise and high stress, fear and anxiety of competitions, excessive and non-scientific pressures without adequate recovery, based on the J model can be used to drop indicators of the health of the immune system that can lead to serious disorders in athletes. It is possible that the results of this study can be useful in strategies for wrestlers. Therefore, the present study is that changes in leukocytes, neutrophils, monocytes, lymphocytes, immunoglobulin- A in elite wrestlers and active seniors would compare.

MATERIALS AND METHODS

This study is causal - comparative designs that researchers with regarding to the dependent variable it pays to investigate possible causes, the study was retrospective, and the researcher is trying to discover the cause to the caused. This study aimed to compare the three groups of elite wrestlers with active seniors about resting levels of immune system in Semnan province. The research population consisted of 60 subjects who selectively in three groups of 20 persons, including activist elite, inactive seniors and control group were selected. With regard to the nature and purpose of the subject, 20 subjects were athletes from the community who were at least 3 years as a member of Team as selective were chosen as the statistical model. Samples by using Med calculator software and mean and standard deviation calculated by previous studies and in 3 groups of 20 were determined. And after the assurance of healthy subjects that by using a questionnaire and a medical examination was conducted and subjects' weight and height were measured with a gauge height. The effect of intervening variables and the troublesome age, weight, history of exercise, medication, time and place of measurement in this study was controlled. In order to further reliability, the measurements were performed by an expert examiner and in a similar way, and to avoid the effect of the time factor on measurements, all participants at the same time of day, at 9 am in the specialized laboratories in Damghan were performed. Variables measuring devices include cell counter device of XS800i manufactured by SYSMEX Japanese, auto analyzer device of COBAS MIRAS instrument manufactured by

ROCH America, syringes and tubes and kits and samples for measurement of blood made by Iran and centrifuging device, wall dial indicator of beria for height measurement based on cm, and scale of Seca models were made in Germany were used . To assess immune measures, the three groups of elite wrestlers, active seniors and control, simultaneously at shafa laboratory in Damghan blood samples as fasting were taken. Anterior brachial vein blood samples taken from subjects and in special tubes containing EDTA anticoagulant was poured. After blood collection, the sample tube was placed on a rotator for 5 minutes until well mixed and for cells measurement, the flow cytometry was used. After preparation of the sample it was into the device and then receives an answer within the time required. In inferential statistics, results and analysis of the data using standard statistical methods (ANOVA and Tukey test) was obtained. In testing hypotheses first K-S test and Levene's test, normal distribution of data and homogeneity of variances were examined. Research hypotheses using inferential methods at a significance level of less than 0.05 was performed.

RESULTS

The subjects of this study were non-random. In **Table 1**, data on height, weight and age of the subjects indicated that body mass index (52/25), height (174), weight (25/77) and age (33/39) of active senior wrestlers is higher than the other two groups. **Table 2** presents data on variables that indicate the index of white globule (73/5) was significantly lower than the control group (6/95). Also the Index of immunoglobulin A in the elite group (134/75) was significantly lower than the other two groups. The index of monocytes, lymphocytes and neutrophils, the white globule in the elite group was higher than the other two groups.

Between resting levels of white globule of active elite wrestlers, active seniors and non-athletes were observed significant difference. To determine group differences, one way ANOVA was performed. Analysis of variance showed a significant difference between groups **(Table 3)**.

With regard to the difference between the groups in the amount of white globules (6/95 - Control, 5/73 – active Elite,6/16 - seniors) Tukey test was performed . Results indicate a significant decrease of white globules in the active elite group compared to the control group but senior group with the other two groups showed no significant difference **(Table 4)**.

Thus, according to the above findings the first research hypothesis is accepted (p.v = 0/012).

Between resting levels of neutrophil of active elite wrestlers, active seniors and non-athletes were observed significant difference. One-way analysis of variance was performed to determine group differences. Analysis of variance showed a significant difference between groups **(Table 5)**.

With regard to the difference between the groups in the index of neutrophils of the three groups (57/09 - Control, 61/75 - elite, 47/92 - senior) Tukey test was performed and the results showed no significant difference in the rate of neutrophil in the elite group compared to control group and rate of neutrophils in the senior group was significantly lower than the control and elite group (**Table 6)**.

So according to the above findings, the second research hypothesis is accepted (p.v=0/000). The monocyte Index, one way ANOVA was performed to determine group differences. Analysis of variance showed no significant difference between groups (**Table 7)**.

So according to the above findings, we can conclude that there is not a significant difference between the three groups of monocytes (0/00- control, 0/33-elite, 0/17 - senior) and third research hypothesis is rejected (p.v = 0/111). In the index of lymphocyte of active elite wrestlers, active seniors and non-athletes were observed significant difference. One-way analysis of variance was performed to determine group differences. Analysis of variance showed a significant difference between groups (**Table 8)**.

With regard to the differences between the groups in lymphocytes Index of three groups (56/27 = control, 62/75 = elite, 55/5 = senior) Tukey test was performed and the results showed that amount of lymphocytes of elite group significantly is higher than the control and senior groups but between control and senior there is not a significant difference (**Table 9)** .

According to the above findings, we can conclude, the fourth research hypothesis is accepted. (p.v=0/011) Resting levels of immunoglobulin A of active elite wrestlers, active seniors, and non-athletes, there is no significant difference. One-way analysis of variance was performed to determine group differences. Analysis of variance showed a significant difference between groups (**Table 10)**.

With regard to the different groups in Index of immunoglobulin A (141 = Control, 134/75 = elite, 141/75 = senior) Tukey test was performed and the results showed that levels of immunoglobulin A in the elite group significantly lower than the control and senior groups and the senior and control groups

showed no significant difference **(Table 11)**. With regard to these findings, we conclude the fifth research hypothesis is accepted (p.v= 0/011).

Table 1: General characteristics of subjects

Body Mass Index Mean + Standard Deviation (M±SD) kg/m2	Age Mean + Standard Deviation (M±SD) Year	Height Mean + Standard Deviation (M±SD) cm	Weight Mean + Standard Deviation (M±SD) kg	Group variable
24/71±2	38/36±2/29	171±0/5	71/4±7/6	**Control**
23/7±1/95	17±0/74	165±0/5	64/42±6/9	**Elite**
25/52±2/05	39/33±3/03	±174±0/4	77/25±7/1	**Active Senior**

Table 2: Display of Descriptive Statistics Variables

Immunoglobulin A Mean + Standard Deviation (M±SD) Mg%	Neutrophils Mean + Standard Deviation (M±SD) %	Lymphocytes Mean + Standard Deviation (M±SD) %	Monocytes Mean+Standard Deviation (M±SD) %	White globule Mean + Standard Deviation (M±SD k/ul	Group Variable
141 ± 3/07	57/09 ± 5/7	56/27 ± 6	0	6/95 ± 1/02	**Control**
134/75 ± 2/75	61/75 ± 5/38	62/75 ± 4/03	0/33 ± 0/49	5/73 ± 0/96	**Elite**
141/75 ± 9/06	55/5 ± 7/49	55/5 ± 7/49	0/17 ± 0/39	6/16 ± 0/82	**Active Senior**

Table 3: ANOVA Results of White Globules in Three Groups

P.V	Statistics F	Mean-squares	Degrees of freedom	The sum of squares	Title
0/012	5/06	4/4	2	8/865	**Between groups**
		0/875	57	27/9	**Inside groups**
		-	59	36/86	**Total**

Table 4: Tukey Test Results in Three Groups of White Globules

Group	Group	Group
Elite and senior	**Senior and control**	**Elite and control**
0/5	0/119	0/01

Table 5: ANOVA Results of Neutrophils in the Three Groups

P.V	Statistics F	Mean-squares	Degrees of freedom	The sum of squares	Title
0/000	14/274	593/305	2	1186/610	**Between groups**
		41/565	57	1330/076	**Inside groups**
			59	2516/686	**Sum**

Table 6: Tukey Test Results of Neutrophils in the Three Groups

Elite and senior	Control and senior	Control and elite
0/000	0/005	0/209

Table 7: ANOVA Results Monocyte Variables in the Three Groups

P.V	Statistics F	Mean-squares	Degrees of freedom	The sum of squares	Title
0/111	2/356	0/135	2	4/32	**Between groups**
		0/319	57	0/638	**Inside groups**
			59	4/971	**Sum**

Table 8: Analysis of Variance of Lymphocytes in the Three Groups

P.V	Statistics F	Mean-squares	Degrees of freedom	The sum of squares	Title
0/011	5/217	188/37	2	376/74	**Between groups**
		36/107	57	11555/432	**Inside groups**
		-	59	1532/171	**Sum**

Table 9: Tukey Test Results in Three Groups of Lymphocytes

Elite and senior	Control and senior	Control and elite
0/016	0/949	0/038

Table 10: Variance Analysis of Immunoglobulin A in the Three Groups

P.V	Statistics F	Mean-squares	Degrees of freedom	The sum of squares	Title
0/011	5/208	175/521	2	351/043	**Between groups**
		33/703	57	1078/500	**Inside groups**
			59	1429/543	**Sum**

Table 11: Tukey Test Results in Three Groups of Immunoglobulin A

Elite and senior	Control and senior	Control and elite
0/949	0/016	0/038

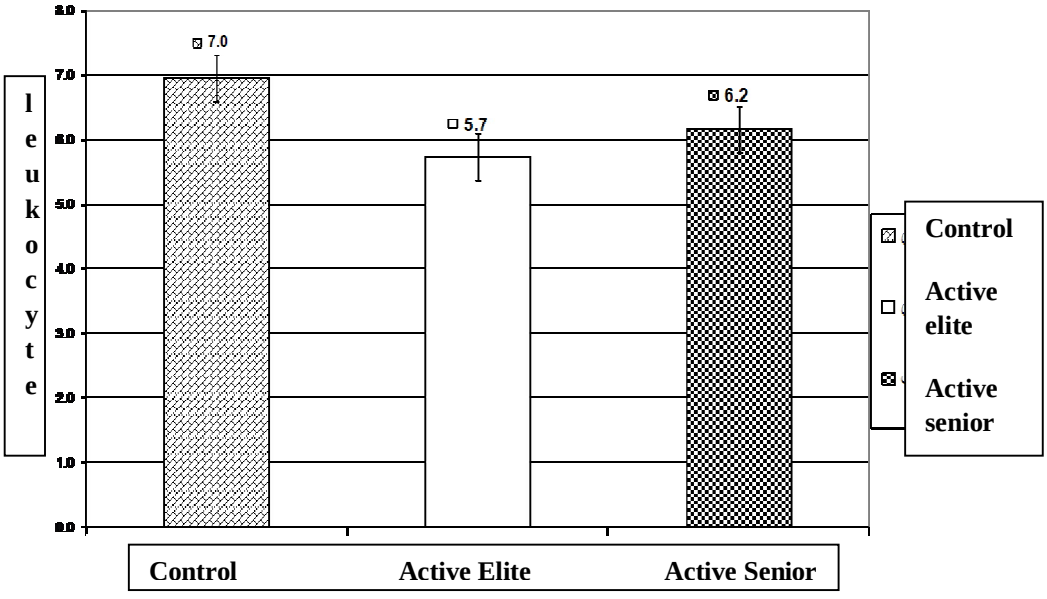

Figure 1: Chart of White Globules in the Three Groups

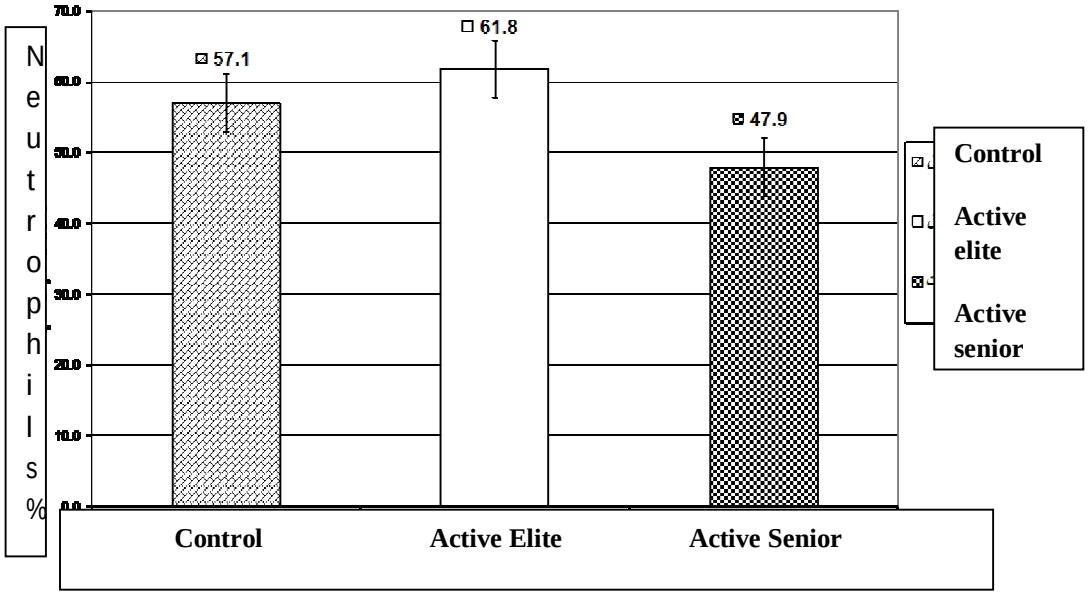

Figure 2: Chart of Neutrophil in Three Groups

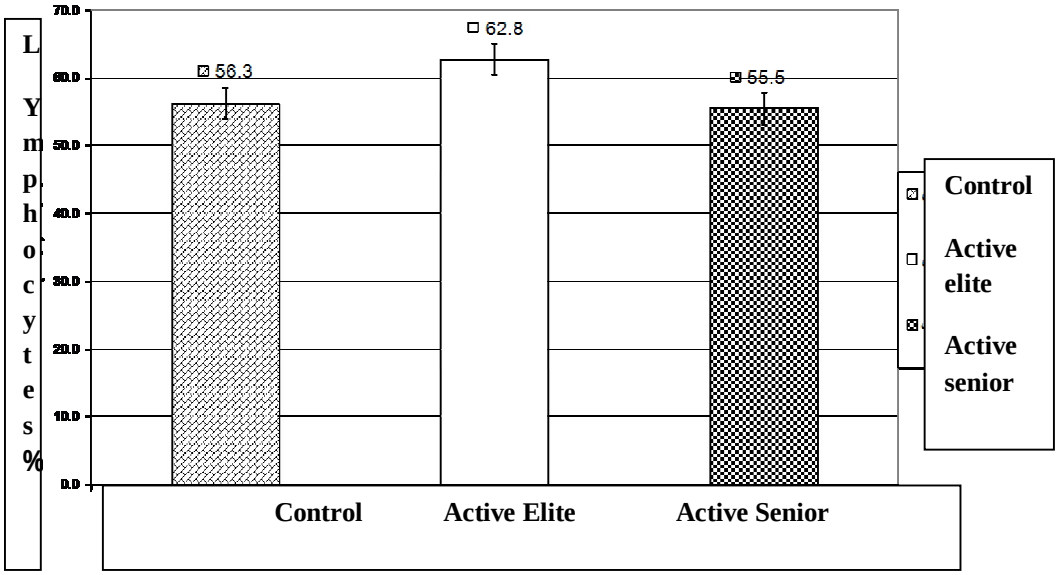

Figure 4: Chart of Lymphocytes in Three Groups

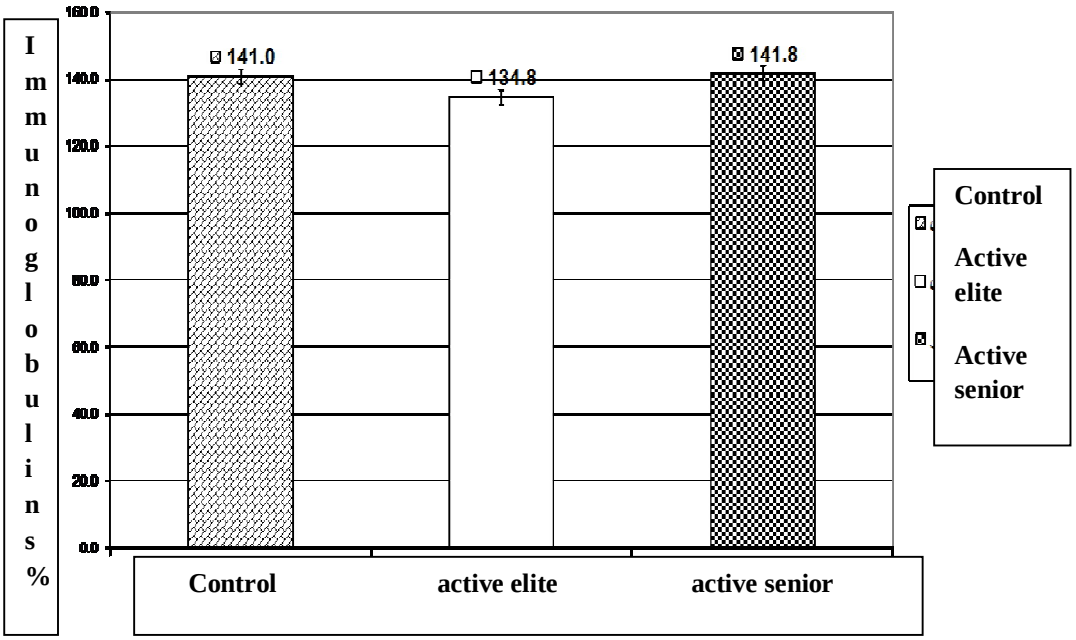

Figure 5: Chart of Immunoglobulin A in the Three Groups

DISCUSSION

The first findings in this study showed no significant difference between the two groups of elite and control in index of white globules can be seen, the results indicate that white globules are more in the control group compared to the elite group. But the difference was not significant in senior group compared to the other two groups. White globules (WBC), which are immune cells in lymphoid organs and other body tissues and are found in the blood circulation and lymphatic. The number of white globules in the control group is 6/95 ± 1/02, the elite is 5/73 ± 0/96 and active senior is 6/16 ± 0/82. Researchers like **[8-12]** in their investigation a significant increase in the number of white globule (WBC) in athletes have reported. **[10]** A study of side effects of energy restriction on changes in immunoglobulins and complement components during periods of weight loss in 49 judo subjects have been studied . Athletes have combined exercise and food restriction and 11 athletes' had dietary restrictions. Changes in anthropometric indices, energy intake, concentration of immunoglobulins and serum complements and number of white globules was assessed at four different times. The results showed that energy restrictions, cause a change in immune parameters such as Immunoglobulins and complement in 7 days after the race intensifies. We think the potential cumulative effects of these changes over a period of a year can lead to a lot of events and abnormal levels of clinical adverse effects in judo and

increase susceptibility to infection. In a study by **[13]** on elite athletes and a control group were determined number of white globules in elite athletes compared to non-athletes showed a significant decrease. Researchers Like [**12-14]** also reported no change or a decrease in WBC in their research that is consistent with this research. The difference between the number of white globules in previous studies, possibly because of differences in mean age, intensity of exercise and fitness and also because of weight loss in elite group , possibly because heavy training and reach the desired weight . In the present study, the elite group has the lowest white globule compared to the other groups that perhaps due to heavy exercise and the lack of adequate rest and weight loss to achieve a desirable weight. Also, no significant difference was observed between the amount of white globules in the control and senior groups, which could possibly be due to the closeness in age groups and reducing the severity and duration of the exercise in senior group. In the case of neutrophils, a significant difference between the two groups of elite and senior and also control and senior groups were observed that the results indicated a higher proportion of neutrophils in the elite group compared to control and senior groups , but this difference in control group compared to other groups was not significant . Neutrophils are from white blood cells and the most abundant cells of granulocytes that cause invasive aliens and cell components alert to phagocytic. The number of neutrophils in the control group is 57/09 ± 5/7, in Elite 61/75 ± 5/38 and in active senior 55/5 ± 7/49. Researches of **[4, 5, 6, 12, 15]** show that the number and percentage of neutrophils with influenced by physical activity would increase, But some researchers unchanged and decreased neutrophil function in response to such activities were reported, [**13-15]** in the present study found a significant increase in the number of neutrophils. **[15]** claimed in his study of the immune response to exercise in children is age dependent, It also identified the number of neutrophils after exercise (recovery period) compared to pre-exercise has a poor correlation with the change in the number of lymphocytes and monocytes. And in another study **[12]**, short-term changes in neutrophils with increase of white globules and decrease in the recovery period after exercise is corresponding with this study. increase of neutrophils after exercise reflect less activities immature cells into the blood , intensity of activity and type of activity cause changes in the number of neutrophils . That is the immediate evacuation of neutrophils from the

bone marrow and increase mature neutrophils into blood circulation , Researchers contradict the findings of other studies because of different methods of training athletes in different sports including the intensity and duration of exercise, rest time between sets and exercises, In the field of combined endurance and resistance exercise, body structure and characteristics of different living conditions and the time of blood collection and measurement methods may be attributed . The study compared two groups of elite each control shows there is no significant changes between two groups of neutrophils which could possibly be due to increase exercise pressure and a little rest in the elite group , also in elite groups suggests that neutrophils in the elite group had a significant increase that according to the investigation, including Hanson stated that short-term intense exercise causes increase of neutrophils, Also in the senior group with the control group, the results indicated that the senior group had fewer neutrophil which may be due to the heavy exercises and increase of training intensity in senior group . Also in connection with the monocytes indicator significant difference between the three groups of active elite, active senior and control was not observed. Monocytes are from mononuclear phagocytic cells that are released from the bone marrow , these cells after mature alert to macrophages , percentage of monocytes in all groups and the number of monocytes was in the control group 0, the elite 0/33 ± 0/49 and active senior 1/74 ± 0/04 . Percentage of these cells in the experimental group compared to other groups had slightly increase that was not significant, researches of [**11-12]** suggests that the number and percentage of monocytes under the influence of physical activity increases, but some researchers unchanged and reduce the number of monocytes after exercise have been reported Such as **[15, 16]**, which is consistent with current research in this study showed no significant change in the number of monocytes . In other words, the present study did not differ among the three groups studied in the monocyte index. **[14]** stated in their study that monocytes quick removal may be due to redistribution and implantation of these cells in the damaged tissue and its role in cytokine secretion be similar to IL-6. Increase of monocytes during and after exercise from the lungs into the blood, can be due to increasing cardiac output and pulmonary blood flow. The increased number of monocytes can be rooted in increased cortisol and epinephrine. Although it appears that increase the number of monocytes in the short term sport be due to increased levels of epinephrine, because of

changes in cortisol levels needs more time and higher intensity. **[16]** studied the effects of intense exercise on teenagers wrestlers and they found that the number of monocytes did not significantly changed after exercise. Also **[16]** showed that the number of monocytes after 90 min of exercise combines strength - resistance with percentage of vomax60 is not significant change which is consistent with the present study and the similarity can be due to the subjects' age and sports history and monocytes index difference with previous studies, probably due to differences in the average age of the group, exercise method, or can be due to the sampling method or type of workout or sport . Index in relation to lymphocytes, a significant difference between two the groups of control with elite and elite group with senior were observed that the results show that amount of lymphocytes is more in elite group compared to control and senior groups, but the difference in senior group was not significant compared to the other two groups. Lymphocytes are the cells that specifically, detect specific foreign antigens and respond to it. The specificity of the immune responses is related to lymphocytes. The number of lymphocytes in the control group of 56/27 ± 6, the elite group of 62/76 ± 4/003, and active senior of 55/5 ± 7/49. Researches on the effects of vigorous physical activity of short-term or long-term, on the percentage of peripheral blood lymphocytes have reported inconsistent results, as **[4, 12, 13]** increased the percentage of lymphocytes following activities physical have reported. Researchers such as **[5, 16]** also decrease and no change in the number of lymphocytes after these activities are reported. Also **[12]**, in his study found that long-term exercise leads to an increase in lymphocytes but not as short and intense activity, the intensity of exercise is a major factor in the change of immune factors, particularly lymphocytes. Also, **[4]** have expressed factors such amount of physical readiness and amount of hormonal responses are affecting factors on responding factors of immune and lymphocytes. Also change of Catecholamines can be an important factor in changes of number of lymphocytes during exercise and after exercise, amount of lymphocytosis depend on intensity of exercise and partly depend on the terms of fitness. Also, the exercise period will affect the amount of lymphocytosis. In senior group due to increase in weight (BMI) may be weakening immune system , much researches has been done in this area such as the **[11, 17]** studied the effect of obesity on the immune system, **[11]** investigation, as did the relationship between body fat and the immune

system. Subjects were two groups of young and old Swedish men and young people who are carrying variable TIL1B that have less fat mass , but the older people IL1B is associated with increased fat mass, results indicate that obesity is associated with tissue inflammation and increased risk of infection and there are multiple relationships between the immune system, obesity and nutrition , and found that in the majority of obese people, obesity is associated with inflammation of adipose tissue and risk of infection. In the present study, in the elite groups with control shows that there is a significant change between lymphocytes and elite group had the highest rates of lymphocytes in comparison to other groups which could possibly be due to physical fitness and changes in the amount of catecholamines and intensity of exercise for long term. But in the senior and elite groups, was associated with an increase in lymphocytes which could possibly be due to high fitness in elite and young age and exercise intensity and long duration of exercises, and no difference of lymphocytes between the control and senior groups probably due to the closeness in age groups, and reduce the severity and duration of the exercise in senior group. The cause the differences and contradictions between the present study with previous researches , perhaps because of the way exercise, the mean age of the subjects and the number of subjects and the difference in the type of sport . The similarity cause could possibly be due to sport history, age of athlete and similarity of exercises.

CONCLUSION

The results of this study showed that cellular immunity in young wrestlers compared with senior group causes increases of lymphocytes and neutrophils in elite group and a decrease in white globules and immunoglobulin A in elite wrestlers, and no significant of monocytes on change in the immune responses (cellular) has emphasized . On the other hand humoral immunity were also significantly affected so that causing a significant decrease in IgA concentration in elite group and the risk of infectious diseases (bacterial, viral) in athletes changed , and at least in mucosal surfaces, such as respiratory infections increase the risk of it . The immune system of senior wrestlers is at low level that can be due to heavy exercises of wrestlers, overweight (BMI), and Increasing age, therefore, this study suggests that elite and senior wrestlers according to above factors be careful in the intensity, duration, type of training, nutrition, and increase or decrease the weight and other factors related to the immune system need to be careful, so that

their immune system should not be weak and change . It is obviously that this case requires a calculated planning and more research is needed in this area.

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