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Investigation of Eosinophil, Lymphocyte and Monocyte Values According to Age and Gender in Insect Bites in The Emergency Department

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Abstract

Background: The purpose of this study was to look at the seasonal distribution, age and gender distribution, and eosinophil, lymphocyte, and monocyte values according to age and gender in cases of insect bites that were brought to the emergency room over the course of a year.

Materials and methods: Retrospective analysis was performed on patients who were brought to the emergency room between 1.12.2021 and 1.12.2022 and had the ICD code W57 (Diagnosis Code - Bitten or stung by Nonvenomous Insects and Other Nonvenomous Arthropods). The following values were noted: age, gender, presenting season, CRP, Leukocyte, Platelet, Lymphocyte, Monocyte, Eosinophil, INR, PTZ, and Aptt levels.

Result: The study comprised a total of 694 patients—308 females and 386 males. The patients were 39.81 16.42 years old on average. Spring saw 9.4% of the patients, summer saw 67%, and fall saw 23.6%. According to the patients' gender, there were significant differences in the eosinophil (t:-3.535; p:0.0010.01) and monocyte (t:-4.909; p:0.0010.01) values. Regarding the season in which the patients were admitted, significant differences in lymphocyte (F:7.045; p:0.0010.01) and monocyte (F:3.208; p:0.0410.05) values were discovered. When the disparities in eosinophil, lymphocyte, and monocyte values were evaluated in relation to the patients' ages, significant differences in monocyte values were discovered (F:2.552; p:0.0270.05).

Conclusion: We commonly see insect bites in emergency rooms, which we can usually cure with straightforward remedies or occasionally without treatment, but in some unfortunate circumstances, we may have to deal with major issues and allergic responses (4). Almost little studies have been done on the seasonal distribution and evaluation of blood tests according to age and gender, despite the fact that there are many studies on this topic in the literature. We think that more study on this topic is necessary.

Keywords: Insect Bites, Emergency Department, Eosinophil, Lymphocyte and Monocyte

Introduction

'Insect bites' are a significant number of patients presenting to the emergency department. Due to the fact that not every patient is admitted to the hospital, the real incidence in the community is unknown. Patients are more likely to see a doctor if they are experiencing symptoms, are uncertain about what bit them, and are in fear. At the stung site, redness, edema, and even discomfort appear in minor cases. But they can also occasionally manifest as urticaria, shortness of breath, and anaphylactic shock. Of fact, treatment may not always be required in certain situations. However, therapy should be provided and hospitalization should be required in extreme cases and in vulnerable individuals (1,2).

Allergy symptoms and alterations in the blood picture can be brought on by insects. Eosinophilia in particular is a shift that is anticipated, but it has the potential to increase neutrophils, induce leukocytosis, and cause local skin infections. Other blood series may also undergo changes as a result (3). Numerous studies on insect bites have been published in the literature. The majority of research, however, focuses on certain insects like scorpions, ticks, and bees. Studies on other insect bites are relatively rare, particularly those whose type or nature the patient is unaware of.

In this study, we looked at the seasonal distribution, age and gender distribution, and values for eosinophils, lymphocytes, and monocytes according to age and gender in cases of insect bites that were brought to the emergency room within a year.

Material And Method

The study was approved by the Non-Interventional Research Ethics Committee of Malatya Turgut Özal University with the decision numbered B.67 on 15.11.2022. This study was

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conducted following the Principles of the Declaration of Helsinki.

Between 1.12.2021 and 1.12.2022, patients admitted to the emergency department with International Classification of Diseases (ICD) W57 (ICD 10 Diagnosis Code - Bitten or stung by a nonvenomous insect and other nonvenomous arthropods) were retrospectively analyzed.

Data of the patients were obtained from computer records and outpatient clinic physician records. Age, gender, season of presentation, Crp (normal values: 0-0.5 mg\dl), Leukocyte (normal values: 4.6-10.2 10^3\uL), Platelet (normal values: 142-424 10^3\uL), Lymphocyte % (normal values: 10-50), Monocyte % (normal values: 0-12), Eosinophil % (normal values: 0. 5-5), Inr (international standardized ratio, international normalized ratio) (normal values: 0.8-1.2), Ptz (normal values: 10-14 seconds) and Aptt (normal values: 56.76-147.45 seconds). Patients with incomplete data and patients under 18 years of age were excluded from the study. Demographic characteristics and laboratory findings of the patients were analyzed. The differences in eosinophil, lymphocyte, and monocyte values according to the gender of the patients and the season of presentation, and the differences in eosinophil, lymphocyte, and monocyte values according to the age of the patients were statistically evaluated.

Statistical Evaluation

Statistical Package for Social Science for Windows (SPSS) 24.0 package program was used to evaluate the data in the study. Frequency and percentage distribution analysis, mean, and standard deviation values were analyzed to determine the descriptive characteristics of the patients evaluated in the study.

Independent Samples t-test was used to determine the significant differences in eosinophil, lymphocyte, and monocyte values in terms of the gender of the patients, and One-Way ANOVA was used to examine the significant differences in terms of the age of the patients and the seasons in which they were admitted.

The results were considered significant at 99% ($p<0.01$) and 95% ($p<0.05$) confidence levels.

Result

A total of 694 patients whose data were accessed in a retrospective computer search were included in the study. Within the scope of the study, 308 (44.4%) of the patients were female and 386 (55.6%) were male. 9.4% of the patients applied in spring, 67% in summer, and 23.6% in fall. The mean age of the patients was 39.81±16.42 years. Table 1 shows the demographic characteristics of the patients. Table 2 shows the mean laboratory data of the patients. When the differences in eosinophil, lymphocyte, and monocyte values were analyzed according to the gender of the patients and the season of presentation; significant differences were found in the eosinophil (t:-3.535 ; p:0.001<0.01) and monocyte (t:-4.909 ; p:0.001<0.01) values in terms of the gender of the patients. Accordingly, eosinophil and monocyte values of male patients were found to be higher than female patients. No significant difference was found in lymphocyte values in terms of the gender of the patients.

Table 1: Demographic Characteristics of the Patients

Characteristics		
Gender	**N**	%
Female	308	44.4
Male	386	55.6
Season		
Spring	65	9.4
Summer	465	67.0
Fall	164	23.6
Age	**Average**	**s.s.**
	39.81	16.42

Significant differences were found in the lymphocyte (F:7.045; p:0.001<0.01) and monocyte (F:3.208; p:0.041<0.05) values in terms of the season in which the patients were admitted. The differences found were significant between the lymphocyte and monocyte values of the patients admitted in the fall and the values of the patients admitted in the spring and summer seasons. Accordingly, the lymphocyte and monocyte values of the patients admitted in the fall were lower than the lymphocyte and monocyte values of the patients admitted in the spring and summer seasons.

When the differences in eosinophil, lymphocyte, and monocyte values were analyzed according to the ages of the patients, significant differences were found in the monocyte (F:2.552; p:0.027<0.05) values of the patients in terms of the ages of the patients. The differences found were significant

Table 2: Laboratory Results of the Patients

Parameters	**Average**	**s.s. ±**
Crp (0-0.5 mg\dl)	0.33	0. 87
Leukocyte (4.6-10.2 10^3\uL)	9.32	2.64
Platelet (142-424 10^3\uL)	256.84	66.18
Lymphocyte % (10-50)	30.16	9.89
Monocyte % (0-12)	7.64	2.23
Eosinophil % (0.5-5)	2.35	1.94
Inr (0.8-1.2)	1.00	0.14
Ptz (10-14 minutes)	11.98	1.92
Aptt (56.76-147.45 minutes)	106.34	15.96

between the monocyte values of patients aged 20 years and younger and patients in other age groups. Accordingly, the monocyte values of patients aged 20 years and younger were higher than the monocyte values of patients in other age groups.

No significant differences were found in the eosinophil and lymphocyte values of the patients in terms of age.

Discussion

In emergency rooms, we commonly see patients who have been bitten by insects. Fortunately, most of the time, these patients can recover without therapy or with just minor complications from their bites (4). Almost little studies have been done on the seasonal distribution and evaluation of blood tests according to age and gender, despite the fact that there are many studies on this topic in the literature. Particularly, case reports predominate in studies pertaining to blood values. As a result, the majority of the conversation will be focused on our research.

It is possible that there are numerous undiscovered bug species in the planet, hence many different types of insects may be responsible for insect bites. The kind of bug that bit the person, especially the fluid inside the insect that is thought to be harmful to humans, has a direct impact on whether the patient experiences an allergic reaction and, if so, what kind and how severe the symptoms are. Everybody can get bitten by an insect, but whether or not a reaction happens, and if it does, how severe it is—how much the bite swells, itches, and is red—varies considerably from person to person and is more noticeable in vulnerable youngsters. In our study, patients under the age of 20 had monocyte levels that were greater than those of patients in other age groups. Due to hypersensitivity, lymphocytosis is expected in cases of bug bites, although monocytosis is less common (5).

Hypersensitivity to insect bites is the most common allergic dermatitis. At the cellular level, skin lesions are characterized by massive eosinophil infiltration caused by an underlying allergic response (6,7). In another study, in a patient who developed cellulitis as a result of an insect bite, no significant abnormality was found except mild eosinophilia in the complete blood count (8). In our study, eosinophil and monocyte values of male patients were found to be higher than those of female patients. No significant differences were found in eosinophil and lymphocyte values in terms of the age of the patients.

After an insect bite, symptoms such as localized itching, redness, and swelling usually occur on the skin. As expected, it is observed much more frequently in hot weather, especially in spring and summer (9). The reasons for this include a significant increase in the number of insects in hot weather and a preference for outdoor activities more frequently. In this study, 67% of the patients presented in the summer months. In winter months, the number of applications is almost negligible. In Bischof's study, the 2 months with the highest incidence of insect bites were August and September. Since the seasons were not divided into months in our study, we cannot say anything clear about this. However, in our findings, it was detected more in the fall than in the spring (10).

Again, a substantial difference between the lymphocyte and monocyte values of patients treated in the fall and those of patients admitted in the spring and summer was discovered when blood tests were evaluated according to the seasons. Therefore, compared to patients admitted in the spring and summer, the lymphocyte and monocyte levels of patients admitted in the fall were lower. This is not quite clear as to why. Perhaps as winter draws near, insects' capacity to elicit a response declines.

Sometimes, when an insect bite occurs in the early hours during the acute phase, there may be no reaction. Serious reactions, nevertheless, can happen later, sometimes even days after the bite. Therefore, the patient should be informed that more serious reactions could manifest if they receive insect bites at the emergency room or an outpatient clinic. If clinical progression occurs despite proper treatment, patients should be admitted to the hospital. The first few seconds after a bite typically involve unpleasant pain. Following that, the body reacts by manifesting an allergic reaction on the skin. At the bite site, there is an increase in warmth, itchiness, redness, and similar allergic symptoms. The compounds that the insect injects into our skin, either by its saliva or through its sting, cause the allergic reaction. These reactions are often modest in nature and go away quickly after an insect bite (4,11). However, symptoms may gradually worsen and cause serious health issues in people who are allergic to insect secretions.

Conclusion

We commonly see insect bites in emergency rooms, which we can usually cure with straightforward remedies or occasionally without treatment, but in some unfortunate circumstances, we may have to deal with major issues and allergic responses (4). Almost little studies have been done on the seasonal distribution and evaluation of blood tests according to age and gender, despite the fact that there are many studies on this topic in the literature. We think that more study on this topic is necessary.

Table 3: Differences in Eosinophil, Lymphocyte, and Monocyte Values According to the Gender of the Patients and the Seasons of Admission

		Average .±s.s.	t - F	p
Eosinophil % (0.5-5)	Female	2.06±1.79	t:-3.535	**.001[a]****
	Male	2.58±2.04		
Lymphocyte % (10-50)	Female	30.78±10.06	t:1.476	.140[a]
	Male	29.67±9.73		
Monocyte % (0-12)	Female	7.18±2.08	t:-4.909	**.001[a]****
	Male	8.01±2.28		
Eosinophil % (0.5-5)	Spring	2.19±1.73	F:.308	.735[b]
	Summer	2.38±1.91		
	Fall	2.33±2.12		
Lymphocyte % (10-50)	Spring	30.39±10.28	F:7.045	**.001[b]** (3-1. 3-2)**
	Summer	31.01±9.67		
	Fall	27.67±9.99		
Monocyte % (0-12)	Spring	8.03±2.19	F:3.208	**.041[b]* (3-1. 3-2)**
	Summer	7.71±2.25		
	Fall	7.29±2.17		

Table 4: Differences in Eosinophil, Lymphocyte, and Monocyte Values According to the Age of Patients

		Average .±s.s.	F	p
Eosinophil % (0,5-5)	20 ≥	2.19±1.68	F:1.513	**.183**
	21-30	2.63±2.36		
	31-40	2.26±1.84		
	41-50	2.31±1.46		
	51-60	2.46±2.27		
	61 ≤	2.03±1.51		
Lymphocyte % (10-50)	20 ≥	30.55±9.00	F:1.369	.234
	21-30	29.87±9.34		
	31-40	29.92±9.33		
	41-50	31.75±9.93		
	51-60	30.77±10.94		
	61 ≤	28.38±11.05		
	20 ≥	8.21±1.83		
Monocyte % (0-12)	21-30	7.92±2.64	F:2.552	**.027* (1-3. 1-4 1-5. 1-6)**
	31-40	7.72±2.04		
	41-50	7.52±2.38		
	51-60	7.53±2.13		
	61 ≤	7.08±2.20		
	Fall	7.29±2.17		

One-Way ANOVA , *p<0.05 , **p<0.01

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