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Serous Meningitis in the Infectious Clinic of Pristina, Kosovo during 2019-2020

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KEYWORDS

Diseases Clinic, infection, treatment, serous meningitis.

ABSTRACT:

Serous meningitis is an inflammation of the meninges associated with the acute onset of meningeal and febrile symptoms, cerebrospinal fluid pleocytosis and no increase in bacterial cultures. Meningeal syndrome includes nuchal stiffness, vomiting, photophobia, headache, and other signs. The purpose of this paper is to present the epidemiological, clinical and laboratory features of cases with serous meningitis treated at the Infectious Diseases Clinic within the studied period and also to present the impact of the COVID-19 pandemic on the number of cases treated in the clinic. The total number of patients with serous meningitis who received services during the period January 2019 to December 2020 was 57. The number of patients was much higher in 2019 compared to 2020.

1. Introduction

Aseptic meningitis is a serous inflammation that affects all three protective membrane layers that cover the brain and spinal cord, called the meninges [1]. The term "aseptic" usually refers to a process free of contamination caused by harmful bacteria, viruses, fungi, or parasites. Therefore, aseptic meningitis can be defined as meningeal inflammation Cerebrospinal Fluid (CSF) pleocytosis ≥ 5 cells/mm3 - not related to an infectious process [2]. Usually caused by several viruses, there are also a number of other etiologies, infectious and non-infectious. Therefore, the term aseptic meningitis is no longer synonymous with viral meningitis, although the two are still often used interchangeably [1]. Most pathogens that cause meningitis colonize the nasopharynx or upper respiratory tract before entering the Central Nervous System (CNS) through hematogenous spread, then persistent spread of infections to the nose, eyes, and ears, and retrograde transport along or within peripheral or cranial nerves or as direct infection. (e.g., due to head trauma or surgery).

Aseptic meningitis is the most common form of meningitis with an annual incidence of 7.6% per 100,000 adults. Most cases of aseptic meningitis are viral and require supportive care. Aseptic meningitis is generally self-limiting with a good prognosis. Examination maneuvers such as Kerning's sign or Brudzinski's sign may not be useful in differentiating bacterial from aseptic meningitis because of variable sensitivity and specificity. Because clinical findings are also unreliable, diagnosis relies on examination of cerebrospinal fluid obtained by lumbar puncture. Treatment should begin immediately in cases where transfer, imaging, or lumbar puncture may delay a definitive diagnosis [1]. Aseptic meningitis usually develops symptoms in 2–14 days, depending on the type of virus [3].

2. Literature Review

A. Etiology and epidemiology

Aseptic meningitis can be caused by infectious and non-infectious causes. Non-infectious causes: include drugs (NSAIDs, trimethoprim/sulfamethoxazole, Intravenous Immunoglobulin (IVIG), vasculitis (including those caused by autoimmune diseases such as lupus or Sjogren's disease), sarcoidosis, and malignancy, including up to metastases. Viral Causes: enteroviruses are by far the most common identified cause of aseptic meningitis (85-90%), but others include arboviruses, herpesviruses (including HSV-2, HSV-1, VZV, EBV, CMV), influenza, measles, choriomeningitis lymphocytic virus, mumps, HIV. Mollaret syndrome is defined as recurrent aseptic meningitis that has been associated with HSV-2 [4]. Viral meningitis occurs throughout the year, but is most commonly seen in summer and fall [5]. Bacterial causes: of aseptic meningitis may include partially treated meningitis, parameningeal infection (such as epidural abscess and

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mastoiditis), Mycoplasma Pneumoniae, Endocarditis, Mycobacterium Tuberculosis, Treponema Pallidum, and Leptospirosis. Fungal causes: may include Candida, Cryptococcus Neoformans, Histoplasma Capsulatum, Coccidioides Immitis, and Blastomyces Dermatitidis.

Parasites: causing aseptic meningitis include Toxoplasma gondii, naegleria, neurocysticercosis, trichinosis and Hartmannella. For non-infectious causes of aseptic meningitis, etiologies can be classified into three main groups: a) Systemic diseases with meningeal involvement (e.g., sarcoidosis, Behçet's disease, Sjögren's syndrome, systemic lupus erythematosus and granulomatosis with polyangiitis). b) Drug-induced aseptic meningitis (most commonly reported with Nonsteroidal Anti-inflammatory Drugs (NSAIDs), antibiotics (sulfamides, penicillin), intravenous immunoglobulin, and monoclonal antibodies). c) Neoplastic meningitis (which may be associated with either solid cancer metastasis or lymphoma/leukemia [6].

Enteroviruses remain the most common cause of aseptic meningitis. Some enteroviruses (e.g., coxsackie B5, echovirus 6, 9 and 30) are more likely to cause outbreaks of meningitis, while others (coxsackie A9, B3 and B4) are mostly endemic. Nucleic acid tests are more sensitive than cultures in diagnosing enteroviral infections. In centers where the turnaround time for these tests is less than 24-hours, there can be significant cost savings and the avoidance of unnecessary treatment of aseptic meningitis with antibiotics.

Serum and stool samples are important additional samples for the diagnosis of enteroviral infections in children. CSF protein (≥0.5 g/l) and serum procalcitonin (≥0.5 ng/ml) appear to be useful laboratory markers for distinguishing between bacterial and aseptic meningitis in children aged 28 days to 16 years , but they have relatively low sensitivity and specificity [2].

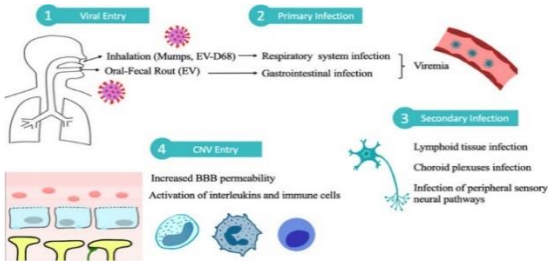

Fig. 1. Schematic view of the general features of the pathogenesis of viral meningitis based on **[7]**.

More than 90% of all cases of serous meningitis are caused by Enteroviruses. Common EVs are found in a worldwide distribution, although only a specific minority of their serotypes predominate in a given part of the world in any given year. Humans are their only natural reservoir and they are transmitted mainly by fecal-oral contamination and less often in respiratory secretions. As such, EVs exhibit a seasonality from summer to autumn in temperate climates and a high incidence throughout the year in tropical and subtropical areas (presumably due to sparse clothing and lower standards of hygiene of children in these environments). Indeed, although EVs are still the most common cause of viral meningitis in adults, most cases occur in children under 5 years of age [8].

According to [7], Different type of studies have shown that the incidence of aseptic meningitis decreases with increasing age (58.7 per 100,000 after birth, 38.7 per 100,000 in 6-month-old infants, and 15.6 per 100,000 in 5-year-old children). The most recently discovered viral agent causing meningitis was reported in a case study of a 24-year-old male from Japan who had aseptic meningitis caused by SARS-CoV-2, which was demonstrated by performing an RT-PCR test on a sample of CSF from the patient. This case report demonstrates the possible neuroinvasive potential of SARS-CoV-2 and its potential to cause CNS complications such as meningitis [9].

B. Pathophysiology

Based on [9], the pathogenesis of meningitis begins when the causative agent enters the host via respiratory secretions or via the fecal-oral route to cause primary infection in the respiratory or gastrointestinal tract (GIT). This is followed by secondary infection of the CNS, causing meningitis or other neurological problems. Infection of the CNS can occur through various mechanisms, such as infection of the choroid plexus epithelium, infection of lymphoid tissue, induction of inflammation and disruption of the blood-brain barrier (BBB), and infection of peripheral sensory nerve pathways.

Viral pathogens can infect and migrate into the CNS via peripheral sensory, motor neurons or olfactory sensory neurons whose dendrites are directly exposed to the nasal airways [10], [11] and [12]. Pathogens can also reach the CSF through hematogenous spread by two main

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mechanisms: a) infecting immune cells, which in turn carry the pathogen to the nervous system, and b) crossing the blood capillaries and entering the CSF as free pathogens [8]. As a virus reaches the central nervous system (CNS) and spreads through the subarachnoid space, it triggers an inflammatory response that results in meningitis. The mumps virus is highly neurotropic and can directly infect the epithelium of the choroid plexus. Enteroviruses multiply outside the CNS and reach the CNS via hematogenous spread. A persistent inflammatory state then leads to decreased cerebral perfusion, cerebral edema, increased intracranial pressure, metabolic and vascular disturbances, all contributing to neuronal damage and ischemia [7].

The changes are localized in the leptomeninges (soft tissue of the brain) and consist of accumulation of exudate which consists of lymphocytes and plasma cells. Congestion of the meninges is characterized by hyperemia of the meninges and hypersecretion of CSF. The inflammatory process can be interrupted at this stage or progress further into serous inflammation. Hyperemia of the leptomeninges gives the clinical manifestations of meningism with signs of increased intracranial pressure without changes in CSF [8]. Once the viral agent enters the CNS, increased levels of chemoattractants, neutrophils, CD8 T cells, and monocytes are detected, indicating the induction of an immune response. [9]. A study using a murine viral meningitis model in which mice were infected with lymphocytic choriomeningitis virus (LCMV) showed elevated levels of IL-6 and IFN-γ (gamma) in the CNS. While IL-6 levels in the CSF began to increase significantly within 24-hour post-infection, IFN-gamma levels were not detected until 5–6 days post-infection.

IL-6 concentrations in the CSF were also found to be elevated over 48-hours. Initial infection with enterovirus 71. Among patients with culture-proven enteroviral meningitis, the meningeal inflammatory cascade also involved elevated levels of tumor necrosis factor alpha (TNF-alpha) and interleukin 1 beta (IL-1 beta) based on [9]. Another study showed an increased level of IL-1β (a pro-inflammatory cytokine) in patients with aseptic meningitis. Therefore, a strong inflammatory immune response is induced during aseptic meningitis and plays an important role in the pathogenesis of the disease [10].

C. Clinical manifestations

The clinical disease observed in patients with serous meningitis may vary with the host's age and underlying immune status, and may extend from the spectrum of an asymptomatic pleocytosis to a disease that causes an alarming degree of neurological damage. Despite this heterogeneity, however, most patients with aseptic meningitis present with fever accompanied by complaints of headache, neck stiffness, malaise, anorexia, and vomiting. In neonates, CNS involvement may or may not be evidenced by overt signs of meningeal inflammation (stiff neck, bulging anterior fontanel), but in the setting of infections caused by EVs, the neonatal population often shows evidence of in systemic involvement as in the form of hepatic necrosis, myocarditis and enterocolitis.

Onset may occur within hours of exposure or evolve more slowly over several days. Usually, the maximum deficit appears within 3 to 6 days after exposure. People infected with the viruses that usually cause aseptic meningitis can remain infectious for weeks after contracting the virus. The characteristic signs of acute viral meningitis include the following: Headache, Fever, Neck stiffness, Photophobia, Drowsiness, Myalgia's, Illness, Sore throat, Stomachache, Nausea and vomiting. Focal signs, seizures, and profound lethargy are rarely features of aseptic meningitis. Occasionally, patients may exhibit altered levels of consciousness, including confusion and visual hallucinations [11].

D. Diagnosis, Treatment and Forecast

The diagnosis of meningitis begins with a physical examination and a review of the patient's health history. To test for etiologic agents, a lumbar puncture and collection of CSF is needed. In viral meningitis, the leukocyte count usually ranges between 80 and 100 cells/μl (pleocytosis), with a large proportion of lymphocytes (>80%). In addition, glucose and protein levels usually remain normal. Pleocytosis is generally considered an important criterion for the diagnosis of viral meningitis. The gold standard tool for diagnosing viral meningitis is the polymerase chain reaction (PCR), which detects and quantifies viral DNA or RNA in the patient's CSF [11].

Early recognition of the most likely cause of meningitis is essential to start treatment as soon as possible. Initial stabilization of the patient is necessary, and intravenous fluids for 48 hours have been shown to be beneficial [4].

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If HSV or varicella-zoster (VZV) is suspected, intravenous acyclovir should be added to empiric treatment [13]. Management of viral meningitis (excluding HSV and VZV) is more supportive care. Steroids are used as adjunctive therapy to reduce the inflammatory response. They have been shown to be successful in reducing sequelae (short-term neurological sequelae and hearing loss), although this is more true for bacterial meningitis [14]. Viral meningitis is usually a benign condition and complete recovery usually occurs in 5 to 14 days in most patients with only fatigue and headache as residual symptoms [15]. Adults with enterovirus meningitis may have symptoms for several weeks, but the disease is usually less severe than in children. While viral meningitis is usually self-limiting, it can become more severe [16].

E. Complications

Aseptic meningitis can be complicated by seizures and progress to status epilepticus. This complication requires treatment, but prophylaxis is not recommended [15]. Enterovirus meningitis usually has a benign course, while enterovirus encephalitis can result in long-term neurological sequelae. Certain enterovirus subtypes, such as EV71 and EV68, are associated with more severe neurological disease and worse outcomes. The most serious complications of enteroviral meningitis are meningoencephalitis, myocarditis and pericarditis [16].

3. Motivation and Objectives

The purpose of the paper is to present the epidemiological, clinical and laboratory features of cases with serous meningitis treated at the Infectious Diseases Clinic within the studied period and also to present impact of the COVID-19 pandemic on the number of cases treated, therefore the impact of the COVID-19 pandemic on the health services offered to other non-Covid patients.

Additionally, the idea or the objectives of this paper were to make a general comparison of the number of patients and their treatment over two consecutive years. One of the other objectives was the burial of the treatment of patients during the period of Covid-19 in 2020, who have not had the opportunity to be hospitalized within the infectious clinic due to the pandemic. This results in the fact that the patients did not even have the opportunity to be diagnosed, and those who were diagnosed only received a treatment home.

4. Methodology

This is a single-center, observational, retrospective cohort study. Demographic, clinical, laboratory and biochemical data as well as the method of treatment, the course of the disease and its outcome were collected retrospectively from 57 patients hospitalized at the Infectious Diseases Clinic in Pristina with serous meningitis, during the years 2019 and 2020.

In addition, the way of using the data and extracting the statistics is based on the mixed-method or qualitative to quantitative data. Initially, we kept some anamnesis with the patients in the infectious clinic in Pristina. Then after the anamnesis, we defined and started the patient survey. After collecting the results, they were processed with the SPSS program. The statistical processing of the data was carried out with the program IBM SPSS Statistics Version 26 and was presented in Microsoft WORD through relevant tables and graphs. Statistical parameters such as: frequency, arithmetic mean, minimum, maximum and standard deviation (SD) were calculated. The difference between groups was assessed through the One-Way ANOVA test. A p value of less than 0.05 was considered statistically significant.

5. Results

The total number of patients with serous meningitis who received service at the Infectious Disease Clinic in the period January 2019 to December 2020 was 57. The number of patients was much higher in 2019 compared to 2020. In 2019 there were a total of 54 patients or 94.7%, while in 2020 there were 3 patients or 5.3%. Out of a total of 57 patients, 14 (24.6%) of them belonged to the female gender and 43 (75.4%) belonged to the male gender.

As for the number of cases by month for the period January 2019 to December 2020 that sought treatment at the Infectious Disease Clinic due to serous meningitis, it results that in the month of July the frequency of cases was greater with 14 cases per month or (24.6 % per month). While for the month of June there were 10 cases or (17.5%), in the month of August 8 cases or (14%), in the month of October there were 6 cases or (10.5%), in the months of January and November with 4 cases each or (7% each month), the months of April and December

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with 3 cases each or (5.3% each month), the months of May and November with 2 cases each or (3.5% each month), and the month of February with only 1 case or (1.8%), while in in March 2019, no cases were admitted to the Infectious Disease Clinic. From a total of 57 cases in this period, young ages up to 10 years prevail, where 7 cases are at the age of 5 years, from 5 cases at the age of 1, 6 and 9 years, 4 cases at the age of 4, 7 and 8 years, 3 cases at the age of 2, 12 and 14, while the 3 and 11 age groups have 2 cases per age group.

Other age groups are represented by one case each. Regarding the onset of the disease before hospitalization (in days), we can say that the average for the period January 2019-December 2020 for 66 patients with serous meningitis was 2.0 (min 1 to max 10, SD 2.261). In most of these cases, the disease had a short course of development (on average 2 days before hospitalization) which makes us understand the acute course of the disease. In twenty-seven cases (47%) the disease began one day prior to hospitalization; in three cases (5%) it began two days prior; in seven cases (12%) it began three days prior; in eight cases (14%) it began four days prior; in seven cases (12%) it began five days prior; in two cases (4%) it began six days prior; in one case (1.8%) it began eight days prior to hospitalization; and in two cases the disease began ten days prior to hospitalization.

The average number of days of hospitalization for the period January 2019 - December 2020 was 10 days (min 1 to max 21, SD 4.164). On the occasion of the admission to the Infectious Disease Clinic of patients with serous meningitis in the period January 2019 to December 2020, we note that in 54 cases or 94.7%, vomiting and headache were present, in 52 cases or 91.2% temperature, and in 25 cases or 43.9 % had other symptoms at the time of admission. However, in this case it can be seen that the predominant symptoms were vomiting, temperature and headache.

Table I. Statistical data related to laboratory data for patients diagnosed with serous meningitis in the period January 2019 - December 2020

LABORATORY DATA	AVERAGE	MINIMUM VALUE	MAXIMUM VALUE	STANDARD DEVIATION
LEUCOCYTES (IN NUMBER)	10	4	17	3.039
NEUTROPHILS (%)	77	0	762	93.63
CSF (CELL ELEMENTS) - NUMBER	160	21	1173	221.21
CSF(CELLULAR ELEMENTS PMN (%)	10	0	60	17.925
CSF CELL ELEMENTS LYMPHOCYTES (%)	90	40	100	17.925
CSF GLYCORRACHIA	3	0	5	1.02
CSF PROTEINORRACHIA	1	0	5	866

As for the laboratory data related to the patients admitted to the Infectious Diseases Clinic in the period January 2019 to December 2020, we can say that the leukocytes on admission for the samples of 57 patients had an average of 10 (min 4 to max 17, SD 3.039), neutrophils with average of 77 (min 0 to max 962, SD 93,630), cellular elements in number in the cerebrospinal fluid with an average of 160 (min 21 to max 1173, SD 221,206), cellular elements in the form of polymorphonuclear (in this case P) in the cerebrospinal fluid with an average of 10 (min 0 to max 60, SD 17.925), cellular elements such as lymphocytes in the cerebrospinal fluid with an average of 90 (min 40 to max 100, SD 17.925), glycorrhachia determined in the cerebrospinal fluid with an average of 3 (min 0 to max 5, SD 1.020) and proteinorrhacia with average 1 (min 0 to max 5, SD 866).

Symptomatic treatment was applied in 57 cases or in 100% of the cases with serous meningitis admitted to the Infectious Disease Clinic in the period January 2019 to December 2020. In 55 cases or 96.5% of the cases, antiedematous therapy was applied. Antibiotic treatment was applied in 10 cases or 17.5%, corticosteroid treatment was applied in 2 cases or 3.5%, while 56 cases

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or 98.2% of cases were treated with other treatments. From a total of 57 cases hospitalized with serous meningitis at the Infectious Diseases Clinic for the period January 2019 to December 2020, it results that in 56 cases or 98.2% the course of the disease was mild, one case or 1.8% the course of the disease was severe.

Table III. One - Way Anova test for gender, age, onset of illness before hospitalization, hospitalization and clinical symptoms

		SUM OF SQUARES	DF	F	SIG.
GENDER	BETWEEN THE GROUPS	0.835	6	0.681	0.666
	WITHIN GROUPS	10.218	50		
	TOTAL	11.053	56		
AGE	BETWEEN THE GROUPS	400.644	6	0.537	0.777
	WITHIN GROUPS	6213.0	50		
	TOTAL	6613.7	56		
THE BEGINNING OF THE DISEASE BEFORE HOSPITALIZATION (IN DAYS)	BETWEEN THE GROUPS	19.579	6	0.612	0.72
	WITHIN GROUPS	266.66	50		
	TOTAL	286.24	56		
HOSPITALIZATION	BETWEEN THE GROUPS	143.28	6	1.442	0.217
	WITHIN GROUPS	827.76	50		
	TOTAL	971.05	56		
TEMPERATURE	BETWEEN THE GROUPS	1.976	6	6.371	0
	WITHIN GROUPS	2.585	50		
	TOTAL	4.561	56		
HEADACHES	BETWEEN THE GROUPS	0.924	6	4.013	0.002
	WITHIN GROUPS	1.918	50		
	TOTAL	2.842	56		
VOMITED	BETWEEN THE GROUPS	0.026	6	0.076	0.998
	WITHIN GROUPS	2.816	50		
	TOTAL	2.842	56		
OTHER SYMPTOMS	BETWEEN THE GROUPS	1.544	6	0.877	0.518
	WITHIN GROUPS	14.667	50		
	TOTAL	16.211	56		

Regarding the end of the disease, we note that in 56 cases or 98.2% the patients ended with complete recovery from the disease, and in 1 case or 1.8%, the disease ended with exitus (death). The comparison of the two groups by means of the One-Way Anova test is not statistically significant, due to the small number of cases in 2020, but it is presented to show how to compare the epidemiological, clinical, laboratory features, the course of the disease and its completion between the two studied groups.

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6. Discussion

On the basis of this research carried out in the Infectious Diseases Clinic for the period January 2019 to December 2020, we have obtained data on the total number of patients with serous meningitis, the structure of patients according to age, gender, the most frequent months, days before the onset of the disease hospitalization, days of hospitalization, clinical signs at the time of admission, laboratory data at the time of admission, types of medication in general, course of the disease and its end. It is clearly observed that the number of serous meningitis cases in 2019 was many times higher (54 cases) compared to 2020 (only three cases). The difference was higher because from the second half of March 2020, all the capacities of the Infectious Disease Clinic were used to treat patients infected with SARS-CoV-2.

The 2019 coronavirus disease (COVID-19) pandemic has brought about significant changes in society, from global and country-specific efforts to control the respiratory spread of the virus (masks, social distancing, quarantine and lockdown measures) to restructuring of health care systems. In our research, a large decrease in serous meningitis cases that have received services at the Infectious Disease Clinic in 2020 is observed, especially we can mention that after the presentation of the first case with COVID 19 in March, not a single patient with serous meningitis was admitted.

Considering the same period as the previous year, i.e. the first quarter of 2019 where 5 cases were received compared to 2020 where only 3 cases were received in this period. While for the second and third quarter of 2019, 52 cases were received compared to the same period of 2020 where no case of serous meningitis was received. Since the appearance of the first case with COVID-19, the entire focus of the Infectious Disease Clinic has been on the treatment of patients infected with the SARS-CoV-2 virus, and we have no data related to cases with serous meningitis that needed to be hospitalized in that period. Consequently, it is not known what happened to the patients in need of serous meningitis treatment in that period, they may have ended up in other clinics of University Hospital and Clinical Service of Kosovo (UHCSK) or private clinics, but everything remains only a hint.

According to [19], in England, the National Reference Unit of Public Health in England (Public Health of England) confirmed 461 cases of meningitis during 2019-2020, which is 12% lower than the 526 cases reported in 2018-2019. Covid-19 and the implementation of social distancing and lockdown measures across the UK from 23 March 2020 has had a significant impact on the spread and detection of other infections including meningitis. Between April and June 2020, 29 individuals were confirmed with meningitis, 76% lower than in the same period a year ago (121 cases).

In our research, the male gender had the highest incidence, where for this 2-year period, 75.4% were male, while 24.6% were female. In addition, regarding the average age of patients with serous meningitis hospitalized for this 2-year period, it was 7, which is generally a predominance of the disease at young ages. The age group most affected by this disease in this research turns out to be the age group 1-10 years old, while the age group least affected was the one up to 67 years old.

Based on our research, it appears that the disease had a rapid course of development, where the average number of days of onset of the disease before hospitalization was 2 days, which describes the rather acute course of serous meningitis, while regarding the days of hospitalization, we can say that the average of the stay in the clinic of patients with bacterial meningitis for this 2-year period was 10 days. Regarding the clinical aspect, in this research the symptoms such as: fever, vomiting and headache dominate. These data obtained from our research match the data found in a research done with children hospitalized at "Aghia Sophia Children's Hospital", which is a tertiary care medical center in Athens, Greece. Of the 506 cases in this research, 98% presented with fever, 94% presented with headache and 67% presented with vomiting [20]. The data obtained from our research match the data of this research.

When we describe the types of medication used in patients with meningitis in the period January 2019 to December 2020, we talk about 4 types of medication where symptomatic medication was used in 57 cases, corticosteroids in 2 cases, antiedematous drugs in 55 cases, antibiotics in 10 cases and drugs others in 57 cases. However, each of these drug groups has been used in most patients with serous meningitis. In this research, the

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course and outcome of the disease was also investigated at the end. In 56 cases, the course of the disease was mild, while in one case it was a severe course that ended in death. Therefore, out of 57 cases in total, 56 of them ended with complete recovery and only one of them with exitus (death).

7. Conclusion

The total number of patients with serous meningitis who received service at the Infectious Disease Clinic for the period January 2019 to December 2020 was 57. The number of cases in 2020 (three patients) was many times smaller compared to 2019 (54 patients). The most frequent months of presenting cases were in June with 10 cases and July with 14 cases (only in 2019). Most of the patients, 43 people or 75.4% were male, while 14 people or 24.6% were female. The average age of patients hospitalized with serous meningitis in the period January 2019 to December 2020 was seven. The most affected age groups with this disease were 1-10 years old, while the least affected were 16-67 years old.

The onset of the disease before hospitalization (in days) was an average of 2 days. The average days of hospitalization of patients with serous meningitis was 10 days. Dominant symptoms at the time of admission were: temperature present in 52 cases, vomiting and headache in 54 cases and other 25 cases. Laboratory data obtained from cerebrospinal fluid and blood were determined for diagnosis. Serous meningitis was treated with four groups of drugs where antiedematous drugs were used in 55 cases, corticosteroids in 2 cases, antibiotics in 10 cases and others in 56 cases. The course of the disease was mild in 56 cases, while only one had a more severe clinical condition. In 56 cases or (98.2%), the disease ended with complete recovery and only one case ended as exitus letalis.

References

1. Hillary R Mount, Sean D Boyle, "Aseptic and Bacterial Meningitis: Evaluation, Treatment, and Prevention," PubMed.gov, 2017. [Online]. Available: https://pubmed.ncbi.nlm.nih.gov/28925647/.
2. "Wolters Kluwer Health, Inc.," 2021. [Online]. Available: https://lww.com/pages/default.aspx..
3. "The United States Medical Licensing Examination (USMLE®)," AMBOSS,, 2020. [Online]. Available: https://www.amboss.com/us/knowledge/Meningitis/.
4. C. Kauffman, "Infectious Disease Advisor," 2021. [Online]. Available: https://www.infectiousdiseaseadvisor.com/home/decision-support-in-medicine/infectious-diseases/aseptic-meningitis/.
5. Sarah A E Logan, Eithne MacMahon, "Logan SAE," in MacMahon E Viral meningitis, 2008, p. p. 336(7634):36–40.
6. H. Kaur, E. M. Betances and T. B. Perera,, "U.S. National Library of Medicine," NCBI, 2021.
7. Jiyun V Kim 1, Silvia S Kang, Michael L Dustin, Dorian B McGavern, "Myelomonocytic cell recruitment causes fatal CNS vascular injury during acute viral meningitis," 2008. [Online]. Available: https://pubmed.ncbi.nlm.nih.gov/19011611/.
8. Ilir Tolaj, Sëmundjet Infektive, Mediaprint, 2018.
9. Dorian B McGavern 1, Urs Christen, Michael B A Oldstone, "Molecular anatomy of antigen-specific CD8(+) T cell engagement and synapse formation in vivo. Nat Immunol," PubMed, 2002..
10. N. Clin,, Aseptic meningitis and viral myelitis, Irani DN, 2008, p. p. 26(3):635..
11. Swati Waghdhare 1, Ashwini Kalantri, Rajnish Joshi, Shriprakash Kalantri, "Accuracy of physical signs for detecting meningitis: a hospital-based diagnostic accuracy study," in Clin Neurol Neurosurg Return, 2010, p. p. 112(9):752–757.
12. CV, "Ann Intern Med," pp. pp. 675-704, 1953.
13. H. K. Z. F. Putz K, "Meningitis. Prim Care," pp. pp. 40(3):707-26, 2013.
14. M. Z. T. H. T. S. S. Mongelluzzo J, , "Corticosteroids and mortality in children with bacterial meningitis," JAMA, pp. pp. 07;299(17):2048-55, 2008.
15. E. S. L. W. S. K. Q. H. R. Shukla B, "Aseptic meningitis in adults and children: Diagnostic and management challenges," J Clin Virol, pp. pp. 94:110-114, 2017 ..
16. M. E. Logan SA, , "Viral meningitis," BMJ, pp. pp. 05;336(7634):36-40, 2008.