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Author(s): Z. Radovanovic

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REPORT ON EASTERN EUROPE

## On the origin of mass casualty incidents in Kosovo, Yugoslavia, in 1990

Z. Radovanovic

*Department of Community Medicine and Behavioural Sciences Faculty of Medicine, Safat, Kuwait*

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**Abstract.** In March 1990, a mysterious outbreak of illness spread suddenly among thousands of ethnic Albanian high school students in Kosovo (Yugoslavia). It was an unprecedented event on the worldwide scale both in terms of the number of cases and in terms of controversies concerning the aetiology. A retrospective analysis indicated that the

epidemic consisted mainly of cases who felt ill in the absence of exposure to any physical agent. It is suggested that in an atmosphere of severe tension between the two ethnic groups living in Kosovo an increased frequency of respiratory infections may have triggered mass sociogenic illness.

**Key words:** Emergency medicine, Epidemics, Mass casualty, Mass hysteria, Mass sociogenic disease, Kosovo (Yugoslavia)

### Introduction

During 1990, in mid-March, a mass outbreak of health disorder occurred in the Serbian province of Kosovo. It affected thousands of people. These individuals were exclusively ethnic Albanians and most of them were young adolescents.

The event drew immediate attention, because of the very high level of friction and mistrust between the two main ethnic groups, Albanians and Serbs. Several groups of experts scrutinized the documentation available on site. They also ran their own detailed investigation by visiting hospitals, clinics, and schools and by examining patients and interviewing teachers and doctors. Most weight was given to information from a multi-centre and multi-ethnic Federal Commission. This Commission was appointed by a Slovenian in charge of health in what was then federal Yugoslavia, and it was chaired by another Slovenian. In its final report [1], produced as early as mid-April, the Commission ruled out any possibility of infection or poisoning. Instead, it proposed that there had been 'induced psychogenic reactions of hysteriform type with superposition'.

This document did not satisfy either of the two ethnic groups. Many Albanian doctors believed that what they had witnessed was an unusual epidemic of poisoning. The majority of their Serbian colleagues also ignored any explanation in terms of psychopathology. They suggested that the incident was faked with the intention of showing Serbs in a bad light but that it failed due to poor organization.

This unique epidemic was referred to in the medical literature on three occasions. First, in 1991, when an international team obtained negative toxicological findings and suggested collective hysteria as 'the most likely explanation' [2].

Second, in 1993, when poisoning was alleged [3]. Finally, this last report was challenged recently [4]. This controversy on aetiology, as well as the absence of any in-depth analysis of the epidemic and its causes, prompted us to scrutinize all the available evidence.

### Methods

A retrospective study of a disease outbreak should normally start with a careful evaluation of the available medical documentation and then eventually extend to the community as a whole. In the case of the Kosovo epidemic there are several factors which rule out such an approach. First, the state of emergency during the epidemic left little time for proper paperwork: The medical files were in complete disarray and lacked the most crucial information [5, 6]. Second, even the Government-appointed Commission [1] failed to see more than two files for all Kosovo hospitals. Different excuses were offered. It was claimed that the documentation had been taken by the police to be photocopied, or that it had been locked away by a person who did not live in the same town, or that it was simply not available. Third, and most important, both Serbian and Albanian doctors made it clear that they would trust neither the edited information that one would be allowed to browse, nor any retrospective interpretation of events by the sharply divided and highly politicized parties.

For these reasons, the author adopted a policy of reliance on documents prepared and released during the epidemic. These were based on the reports of

witnesses who were on the spot immediately or very soon afterwards. Consequently, they are most likely to reflect the facts. These documents include reports of: The Task Force appointed by the Dean of the Faculty of Medicine in Kosovo's capital, Pristina [7]; the Commission of Experts of the Serbian Ministry of Health, Social and Children's Care [8]; Kosovo's Institute of Public Health [9]; Ljubljana's University Clinical Centre [6]; the Commission of Experts of the Federal Ministry of Labour, Health, Veteran Affairs and Social Policy [1]; Minutes of the Pristina's Neuropsychiatry Hospital Medical Staff Meeting [10]; a Statement from a Group of the Medical Staff of the aforementioned Hospital [11]; and finally, a Report to the WHO Regional Director for Europe by the Yugoslav Minister of Labour and Health [12]. Reports of the Federal Institute of Public Health [5] and the Military Medical Academy have been also used. However, since both of these have been labeled confidential, and the latter was not even available in its original and unabbreviated form, they will be commented on only insofar as they are cited in the Federal Commission Report [1]. Newspapers have also been consulted in order to establish whether any non-Albanians were affected. Coverage of the epidemic by local radio might have been useful too but it was not possible to analyse this information.

## Region

Serbs consider Kosovo a cradle of their civilization. It was a central part of their medieval Kingdom and, later, Empire, as well as the area where the critical battle with the Turks was lost, eventually leading to a complete disintegration of the Serbian state in the 15th century. In the early 19th century, Serbian uprisings led to an autonomy and, eventually, independence of the northern parts of Serbia from the Turks, but it was not until 1912 that the Kingdom of Serbia regained the control of Kosovo.

Between the two world wars Kosovo was an integral part of the Kingdom of Yugoslavia. After World War II, it was proclaimed an Autonomous Region and, later, an Autonomous Province within the Republic of Serbia. In 1974, a new Yugoslav Constitution made little distinction between the status of republics and provinces. In the late 1980s, when Yugoslavia was about to fall apart, Serbs blamed confederate elements in the Yugoslav Constitution for the disintegration of the country and in the new Republic's Constitution they abandoned the status Kosovo enjoyed previously. On their part, Albanians proclaimed their own Republic, defying any Serbian authority.

The stalemate created this way has led to a complete polarization between the two ethnic groups. Albanians have experienced Serbs as oppressors while Serbs have treated Albanians as separatists and

traitors. The lack of any contact between the two groups, with one of them imposing 'order' by means of police force, has created an extremely tense and potentially volatile situation.

Kosovo has been by far the poorest part of Serbia and of the former Yugoslavia. Along with the Republic of Albania it can be classed the poorest region of Europe. Its per capita income used to be several times lower than in more developed parts of Yugoslavia. In 1990, Kosovo's birth and infant mortality rates were as high as 27.8 and 34.4 per 1,000, respectively, and the crude rate of natural increase equaled 23.6 per 1,000 [13]. Over time there has been a sharp decrease of the proportion of Serbs [14]. This has been a generally recognized fact despite heated arguments between the two main ethnic groups concerning the reasons for such a trend. Nowadays, the proportion of Serbs in the total Kosovo population of nearly two million may be as low as 10%.

## Case

*Persons.* Due to non-existent, incomplete or missing medical records, the number of affected individuals will never be exactly established. However, from police data on hospitalized patients, the Director of the Federal Institute of Public Health [5] reported that on 24 March 1990 at 2.00 p.m. a total of 854 hospital beds spread over 7 Kosovo towns were occupied by victims of the epidemic. The cumulative number of epidemic-related hospital admissions by that date amounted to 2,993. The information officially sent to WHO [12] was based on the statement of the Kosovo's Chief Epidemiologist concerning 4,009 patients who had requested medical help in 8 Kosovo towns by 30 March. [1].

All available sources of information clearly state that only ethnic Albanians were affected.

In the town of Podujevo, the initial site of the epidemic, 16 female and 9 male students, as well as two male adults, had fallen victims of the outbreak by 21 March. The students were in the age range 17–18 years. One of the adults, a teacher, was 25. The age of the other adult, a courier, was not specified [9].

Doctors in two wards of the Neuropsychiatry Hospital reported basic demographic data on their patients [10]. There were 48 females and 24 males. For 69 students who were included, age varied between 14 and 19. The 3 adults were in their 40's and early 50's. Those individuals and 3 other adults from the wards that did not provide data on the students/adults ratio, had the following occupation: cleaner, sculptor, worker, housewife, miner, and unspecified.

Of 25 females and 10 males who presented themselves to the Clinical Centre of Ljubljana University

[6], all but one were 14–18 year old students. The exception was a 21-year old worker.

Although fragmentary, these data have a consistent pattern: the female/male ratio appears to have been 2/1 while, with some exceptions, teenagers were the age group affected.

*Place and time.* The outbreak began in 'D. Djakovic' High School, in the town of Podujevo, near Kosovo's capital, Pristina. The morning classes were attended by all 80 Serbs and almost half of nearly 2,000 Albanians. The rest of the Albanians attended classes in the afternoon. The Principal gave a detailed written account of the onset of the epidemic. According to his report [1], the chronology of events may be summarized as follows:

**Wednesday 14 March:** In class III-14 (afternoon shift) students complained of feeling sick; the class teacher thought it was influenza.

**Thursday 15 March:** 14 students from the same class did not attend lectures; in the Health Centre they were treated as influenza cases.

**Monday 19 March:** The Deputy Principal and the class teacher visited class III-14 as soon as the first lecture began, to discuss the students' complaints. A number of students were still absent. During this discussion, staff were alarmed to discover that some students had fainted in classes III-9 and III-10. These classes were also located on the ground floor.

At the beginning of the afternoon shift students and staff experienced a strange odour in the school. Classes were dismissed and police were called to the school. Garbage from III-10, as well as ashes from the stove, and a stain from III-14, were all sampled. A biology teacher and 11 students went to the Health Centre and seven were diagnosed as poisoning cases.

**Tuesday 20 March:** Strict control of visitors was introduced and no incident took place in the morning. At noon, between the two shifts, the school was thoroughly searched without any effect. However, soon afterwards a smell began to spread all over the place. The classes were again dismissed and the police called. None of the III-14 students attended classes this Tuesday.

**Wednesday 21 March:** In the morning hours teaching went on smoothly although many students were absent. In the afternoon, however, a smell was reported for the third time and, as on the previous two days, within 10–15 minutes after the classes began. The students were taken out to the courtyard and the classrooms were carefully searched. Again nothing was found.

**Thursday 22 March:** Throughout the day, not a single incident took place in the school's main building which so far had been the only site of the outbreak. However, the Principal was informed in the morning that a problem had occurred in an outlying building. Although administratively belonging to the school, this building was situated 2 km away. While

on his way to this new site of outbreak the Principal met a large number of students going to the Health Centre. The smell occurred during the second class and quickly spread to the courtyard shared by another high school that was left unaffected. The classes were dismissed.

Thursday 22 March marks a turning point of the outbreak. By Thursday morning, reports of illness were restricted both spatially and in terms of the number of cases. Thus, from 19 to 21 March, a total of 18 persons (17 students and a teacher), all from Podujevo High School, were referred to Pristina hospitals or had arrived on their own. On 22 March, 352 patients with similar complaints were admitted [8]. Most of them, especially those who arrived before noon, were from Podujevo. The proportion of cases from other sites increased in the afternoon [8].

Once expanded outside Podujevo, the epidemic almost simultaneously spread all over Kosovo and after only two days gradually started to fade away. As an indirect indicator of the dynamics of the epidemic process, the ratio of yet-not-discharged over all hospital-admitted cases on 24 March at 2.00 p.m. was already rather low in some areas: in Urosevac 0.0 (0/595), in Gnjilane 0.05 (30/619), etc. [5]. By 27 March, 133 patients were still in Pristina hospitals, while in 6 other hospital centres these numbers were much lower [12]. The tail of the epidemic curve extended over the next several days, but the small number of cases that occurred later drew much less attention.

It appears that there were three waves of the outbreak, each with its distinct characteristics. The first one started on 14 March, according to the Principal of the Podujevo High School [1], or 15 March, as recorded by Kosovo's Chief Epidemiologist [9]. Over four or five days, the disease was confined to a single class and the cases had a flu-like symptomatology. The early afternoon of 19 March marks the next phase of the epidemic, both in terms of its distribution (two neighbouring classes were affected) and the clinical picture (acute beginning with fainting). Three days later, on 22 March, the outbreak entered its third phase by spreading to another school building in the same town and, almost simultaneously, to dozens of schools all over Kosovo. The local outbreak had a relatively mild onset with the affected students walking to the Health Centre [1], but elsewhere there was the often abrupt development of dramatic symptoms [1, 6, 10].

*Symptoms and signs.* The main complaints and findings reported by at least two independent observers and experienced by more than one patient are summarized in Tables 1 and 2. The criteria left mydriasis unlisted because it was identified as a characteristic sign only in the Neurology Ward C of the Neuropsychiatry Hospital, and even there just in



**Table 1.** Main symptoms

Source	Headache	Dizziness	Impeded respiration	Weakness/ adynamia	Burning sensations	Cramps	Retrosternal/ chest pain	Dry mouth	Nausea	Remark
Podujevo Teachers [9]	+	+	+	+			+			
Kosovo Chief Epidemiologist [9]				+						Observation of 20 cases*
Inf. Dis. Hospital's Attending Physician [8]		+	+	+	+		+	+		Complaints of 7 index cases
Dean's Task Force [7]		+	+			+				
Ljubljana Clinical Centre [6]	+	+	+	+	+					Complaints of 35 cases
Federal Commission [1]	+		+	+	+	+				Summary findings
Neuropsych. Hospital Psychiatry A [10]	+	+								
Neuropsych. Hospital Psychiatry B [10]					+	+		+		In 5–12 out of 40 cases
Neuropsych. Hospital Neurology B [10]	+	+							+	
Neuropsych. Hospital Neurology C [10]	+								+	

\* On a subsequent visit there was a case with several symptoms.

two of 34 cases. Elsewhere mydriasis was an isolated finding, as in another ward of the same hospital [10], in Ljubljana [6], and in Podujevo [9]. There was substantial indirect evidence that mydriasis was not diagnosed seldom by local doctors. Particularly illustrative in this respect were statements of the external experts [1, 5] on their failure to observe dilated pupils, as opposed to their Kosovo colleagues. Since local sources were not specified, these data could not be presented in Table 1.

Fainting is another sign that does not appear in Table 1. The reason is that it was observed as a repeated loss of consciousness with psychogenic attacks only in one ward of the Neuropsychiatry Hospital [10]. Elsewhere [1, 6] the information was based on personal history rather than on any clinical observation. Other seldom mentioned symptoms include: drowsiness [9], loss of appetite [6], pain in

joints [1] and stiffness of legs [10]. As for the results of clinical examination, irritability was pinpointed in one report [5], and somnolence in another (Psychiatry Ward B of the Neuropsychiatry Hospital [10]). Other signs listed by neuropsychiatrists [10] were found in two to three out of 40 patients from Psychiatry Ward B (bronchial hypersecretion, bronchial breath sounds, heart rhythm disorder) and in 2 out of 34 cases from Neurology Ward C (nistagmus, confusion, disorientation).

*Trigger.* An odour was blamed for the events that took place in Podujevo High School on 19 March and continued over the next few days. Some teachers [9] related the odour to a white powder seen in classroom III-14, the epicentre of the outbreak. For other [1] a fluid that left a stain on the floor of the classroom was the source of emanation.

Table 2. Main signs.

Source	Red colour of face/ears	Conjunctivitis/red conjunctivae	Tachycardia	Scream-ing	Waving hands	Frowns	Jerks, finger/hands convuls.	High blood pressure	Remark
Kosovo's Chief Epidemiologist [9]									Observation of 20 cases: nothing significant, no signs of a disease*
Inf. Dis. Hospital's Attending Phys. [8]		+							Observation of 7 index cases
Serbian Committee of Experts [8]	+	+							
Dean's Task Force [7]	+	+	+						
Federal Institute of Public Health [5]		+		+			+		
Ljubljana Clinical Centre [6]				+	+	+	+		
Federal Commission [1]				+	+	+	+		Summary findings
Neuropsych. Hospital Psychiatry A [10]	+							+	
Neuropsych. Hospital Psychiatry B [10]	+								Occasional finding
Neuropsych. Hospital Neurology B [10]	+								Tachicardia in 1 out of 40 cases.
Neuropsych. Hospital Neurology C [10]	+		+				+	+	Except for convulsions, other signs in 2/34 cases

\* On a subsequent visit there was a case with clinical findings.

The Principal found the smell to be ethyl-like, to compromise breathing and to lead to an immediate stiffness of the limbs. The chemistry teacher, who was on duty on 19 March, reported a suffocating agent causing dizziness and weakness [1].

Neither of the two teachers of Serbo-Croatian language (both Serbs), nor any students in their classes, experienced any trouble on 19 and 20 March, although on the first day one of the teachers thought he felt a burning in his nose at about 7.00 p.m. [1].

The Kosovo Chief Epidemiologist [9], the Head

of the Kosovo Police Criminalistic Technique [1], and the Director of the Podujevo Health Centre [1], all ethnic Albanians, failed to observe any unusual smell in the school. However, on 21 March, the Director of the Health Centre reported smelling tear gas, with an odour like an organophosphorous chemical. His Albanian colleague reported a disinfectant-type odour. A doctor and a technician, both Serbs, denied that any smell was present in the Health Centre.

The majority of cases treated in Ljubljana, coming

from different parts of Kosovo, reported a smell, like an unpleasant perfume, upon arriving at the school; a burning of the nasopharynx was followed by impeded respiration and cramps within 5 to 10 minutes [6].

Of three girls interviewed by the Director of the Federal Institute of Public Health [5], one developed symptoms upon spotting a man with a red bag, another when she entered a shop, and the third one while playing in her courtyard. Some students from Urosevac recalled a smell, while others blamed water in the school; for two of them the illness was aggravated when they took water in the Neuropsychiatry Hospital [10]. A number of cases 'sensed a smoke'. In Neurology Wards A and B, patients complained that their rooms had a vinegar-like odour. A sculptor developed symptoms in his car while giving a ride to some cases. A cleaner got ill while cleaning the floor, but his symptoms aggravated when he opened a water manhole in the courtyard [10].

**Treatment.** Glucose, anxiolytics, and atropine were the most frequently used drugs [1, 5, 10]. Vitamin B<sub>6</sub> ampoules were often administered in the Neuropsychiatry Hospital [10]. Other treatments, such as vitamin C ampoules [1, 9], gastric lavage [8], ampoules of diuretics [10], spasmolytics [10] and corticosteroids [1, 10], were applied occasionally.

**Outcome.** As a rule, recovery took place quickly. It was recorded as a common experience [5] that immediately upon administration of the treatment all symptoms disappeared. Redness of cheekbones and ears, designated the main sign of the disorder by the Serbian Commission of Experts, faded away within an hour [8]. In the Neuropsychiatric Hospital, all doctors from five wards reported that duration of the disorder was short, ranging from 15 minutes to 2 hours [10]. In this Hospital, the difference concerned recrudescence. Generally, a quick soothing of discomfort was followed by no relapses, but in Psychiatry Ward B some patients experienced a relapsed loss of consciousness with psychogenic attacks.

A major exception are Ljubljana's cases, all of whom reported repeated attacks with spasms and fainting up to 10 times a day over several days. Some of them exhibited the attack during their clinical examination, 4–9 days after the incident [6]. A few cases presented to the Federal Commission also had a history of repeated attacks. A doctor in Podujevo, who sensed a smell in the Health Centre on 21 March complained ten days later of still having occasional headaches and weakness. She 'knew she was still ill but she did not wish to admit it to herself' [1].

## Discussion

Controversy is often associated with sudden mass outbreaks of illness especially if the role of physical and psychological factors is obscure. Doubts may take place when a physical cause is likely or possible, as in repetition strain injury [15, 16]; or when its role seems to have been controversial, as in epidemic neuromyasthenia or chronic fatigue syndrome [17, 18]; or when exposure to a physical agent is much below any normally harmful concentration, as exemplified by the 'malathion-induced hysteria' [19]; or when the impact of a physical factor fails to be demonstrated at all, as in a 'pure' epidemic hysteria [20].

The problems are amplified in a hostile environment with poorly equipped medical facilities and a low standard of medical care, as in Kosovo. Here, doctors from the Neuropsychiatry Hospital complained that in the two to three years preceding the epidemic they had not been supplied with some basic psychotropics [1]. The whole Internal Medicine Hospital had only one or two stretchers [5]. The Health Centre in Podujevo did not have a single thermometer [1]. Case histories were scantily filled in if at all [1, 5] and patients discharged from Kosovo hospitals did not have any laboratory tests performed [6]. An additional illustration of the lack of necessary facilities was the decision of the Dean's Task Force [7] that all analyses should be performed 'in respective toxicological laboratories' outside Kosovo.

Exclusive reliance upon medical histories and clinical observation, the only basis for a differential diagnosis for several days, left room for various speculations on the causation of the epidemic. However, even when the results of toxicological examinations were obtained, the evidence was not generally accepted as convincing (Table 3).

**Mass hysteria as an explanation.** As already pointed out, the non-physical aetiology was advocated by the Federal Commission of Experts [1]. Rather than providing direct arguments in support of their suggestion, they ruled out all possible physical agents and then referred to a very similar epidemic among Palestinian schoolchildren in the West Bank of Jordan [21]. Also, cases seen by the Director of the Federal Institute of Public Health would fit the diagnosis of epidemic hysteria, but the report [5] emphasized political maneuvering and staging as the critical factors.

**Poisoning as a cause of the outbreak.** In the report of Kosovo's Institute of Public Health [9], the possibility of either an infectious/parasitary disease or water – and food-borne intoxication has been excluded; room has been left, however, for air-borne poisoning. The Chief Epidemiologist of Kosovo, author of the report, failed to observe 'signs of a disease' among all but one of the Podujevo school-

**Table 3.** Assessment of aetiology by different expert groups

Assessor	Date of the report	Assessment/Conclusion
The Dean's Task Force, Faculty of Med., Pristina [7]	March 22	Aetiology will be established on receipt of toxicological laboratory results.
Serbian Commission of Expert [8]	March 23	Clinically, no signs of health disorder caused by an infectious or toxic agent. Final judgement will be possible when the results of toxicological analyses are obtained.
Federal Institute of Public Health [5]	March 26	Health services were dragged into political events. Everything was prepared in advance, both patients and health services, and conducted with a definite intention and under pressure.
Military Medical Academy [1]	March 26	No chemical substances nor their products were found which might cause an acute poisoning.
Kosovo's Institute of Public Health [9]	March 31	Not an infectious/parasitary disease, nor food/water borne intoxication.
Ljubljana's University Clinical Centre [6]	April 2	No definitive opinion may be given. There is no similar symptomatology in the literature.
Federal Commission of Experts [1]	April 4	Not an infectious disease, water/food borne alimentary intoxication or acute poisoning (neither by inhalatory nor peroral route). It may be explained by induced psychogenic reactions.
Pristina's Neuropsychiatry Hospital Medical Staff Meeting [10]	April 4	No clinical signs of known sorts of poisoning have been established.
A statement from a Group of Doctors from the Neuropsychiatry Hospital [11]	April 6	A possibility of poisoning or contact with a physical agent cannot be definitely ruled out.

children. The exception was a girl who had mydriasis, with pupils reactive to light, red colour of face and ears, and a mild tonsillopharyngitis. The treatment she received, a fairly painful injection of vitamin C, is often administered in Yugoslavia for a quick relief of symptoms in patients without an organic basis for their complaints. It was her impeded respiration following this treatment that led her to a hospital and caused the suspicion of disease.

Five months after the epidemic, the Chief Epidemiologist explained in detail why he could not accept the possibility of psychological causation (I. Dedushaj, written communication). His arguments went back to the year preceding the epidemic when word spread around that the poliomyelitis vaccine was intended to sterilize the children. This caused intense fear so that many children ran away from the vaccination sites in their schools. As the Chief Epidemiologist recalled, some of them jumped through windows as high as two floors above ground level. His point was that, in spite of (one might add: or due to) anxiety, not a single child reported to a health centre anywhere in Kosovo. The analogy was apparently not perfect, since in 1989 patients did their best to avoid the conceived threat, while a year later they relied upon health services for help.

Fourteen psychiatrists of Albanian nationality also refused to accept a psychological explanation for the outbreak. The extensive minutes of the Pristina's Neuropsychiatry Hospital Medical Staff Meeting [10] may be taken as a fair reflection of their concerns since it was only the conclusions rather than the content of the minutes that they later disputed [11]. Thus, one psychiatrist acknowledged that some patients had 'psychiatric problems', but raised the question of those who did not fit into this picture. Another psychiatrist related his doubts to 'the first day' of the epidemic, 22 March, when patients from different sites appeared in the Hospital with the same symptomatology. A third wondered if an outbreak may be induced by telephone; an allusion to the simultaneous occurrence of cases all over Kosovo.

Concerning objective clinical findings indicating possible poisoning, a senior staff member listed red face, mydriasis, and dry mouth. This symptomatology was not given too much weight since atropine was indiscriminately administered prior to and during hospital admission by paramedics and nurses. The main debate concerned a single case diagnosed as having oculogyric crisis. Two Professors from Belgrade disputed the diagnosis. One, a neurologist, found right-sided anosmia, tubular vision, complete



loss of sensation in the limbs, trunk and face, arm immobility as well as resting tremor, and denied a neuroanatomical basis for such a finding. The other, a psychiatrist, indicated that it was a clear case of a dissociation reaction [10].

*Feigned illness as a form of political struggle.* Political motives were most emphasized as an explanation for the outbreak by the Director of the Federal Institute of Public Health [5]. Although in assessing the cases he saw a likely 'induced psychogenic or hysteriform reaction', the whole logistics of admission and treatment led him to challenge, on purely ethical grounds, the alleged involvement of health services in political clashes. He went further claiming that 'everything was prepared in advance' [5].

Serbian experts [8] formally left it to toxicologists to pinpoint the aetiology, but they firmly excluded any physical agent on clinical grounds. Their description of slightly aedematous and bright red conchae and cheeks, returning to normal within an hour, implicated rubbing as a cause of the main clinical finding that they observed, accompanied only occasionally by conjunctivitis. They concluded that neither admission nor treatment were justified at all [8]. Through informal contacts (Z. Maric, personal communication), they assessed as a critical strategic mistake the 'decision of organizers' to 'spread the outbreak' all over Kosovo within the same day. Allegedly, the shortage of a logical explanation for a sloppy 'fixed' natural history of the outbreak led to loss of enthusiasm on the part of 'organizers' to pursue their deception any further.

A conclusion in the Ljubljana's Clinical Centre report on the absence of a similar symptomatology in the literature, along with a highly bizarre clinical finding [6], seems to have pointed also in the same direction. It would be highly improbable that in the most reputable medical institution in the former Yugoslavia, and the only one where the victims of this epidemic had been comprehensively and properly examined, no one had ever heard about more than one hundred epidemics of mass hysteria which took place over the 100 years prior to 1974 [22], or of several major outbreaks described in the medical literature since that time [21, 23–25]. The formulation given above may be understood, therefore, as an attempt to maintain professional reputation of the Clinical Centre, without getting too much involved into other nations' conflicts. Symptomatology unknown to medicine should apparently be attributed to something else.

The Federal Commission's report [1] also allowed the possibility of political motives. If all physical agents were ruled out and the 'induced psychogenic reactions' were listed as the most likely explanation, the question remains what other alternatives there are.

*Appraisal of the evidence.* It will never be possible to pinpoint with certainty the exact reasons that led each of thousands of patients to report, or to be taken, to a doctor. There was apparently a base-line morbidity in the community and the timing of getting ill was probably the only factor some of the cases with a distinct symptomatology had in common with the rest of their diseased countrymen. This holds for the only two in-patients presented to the Federal Commission in the Infectious Disease Hospital. One of them was diagnosed 'with a high probability' as a suspected typhoid case. The other was suffering from a post traumatic root compression of the ischiadic nerve [1]. It also applies to the single most disputed case of the epidemic, the alleged oculogyric crisis attributed to poisoning [10]. And, finally, it applies to the only two cases hospitalized in Ljubljana, hypertension and anaemia [12].

A chronological analysis of the epidemic seems to be important for its understanding. The search for a cause leads to an infectious agent, rather than a poison, as the most likely explanation for the first wave of the epidemic. Although simultaneous occurrence of a flu-like disease in 14 students from the same class without any further spread over several days is unusual for an air-borne infection, we still believe that doctors in the Health Centre were right in diagnosing a respiratory infection. The conditions in overcrowded Kosovo's schools with high absenteeism, poor records of attendance, and a likelihood that some children took advantage of their schoolmates' illness to miss classes themselves would increase the probability that one class with several clustered cases be singled out from others with a lower, but not absent respiratory morbidity.

It was the teachers' concern that coincided with the second wave. When two of them decided to investigate the problem, no odour was an issue yet, but as they entered classroom III-14, in the early afternoon of 19 March, there was a strange smell with fainting in the neighbouring classes.

Two visits of the Kosovo Chief Epidemiologist to Podujevo within the same day, 20 March, upon urgent requests, as well as his visit the next day, illustrate the state of anxiety that existed there. His report [9] on very low hygienic standards in the school, along with an extremely aroused vigilance, may well explain visual (stains, powder) and olfactory sensations by the students. Repeated negative findings by experts (Kosovo's Institute of Public Health, Criminal Police, etc.) suggest that the threat was a perceived, rather than a real one.

There was, of course, the possibility that someone, either a Serb or an ethnic Albanian, intentionally kept planting volatile substances for any reason (a simple childish mischief, an intention to have classes dismissed, a mass homicide attempt, or strict political motives). It is not probable, however, that such a

substance might have played any role other than that of a psychological trigger. Apart from reasons exposed or implied elsewhere in the article, this skepticism is aroused by two additional facts. First, according to the Chief Epidemiologist's report [9], common repeated exposures of over two thousand students resulted in an attack rate of only 12 per 1,000 for the first week of the epidemic (15–21 March). Second, there was no gradient of response whatsoever: the exposed individuals either remained completely unaffected or developed severe symptomatology. This pattern is much more characteristic of mass hysteria than physical illness.

The third wave of the epidemic, however, provides the main argument against the poisonous gas theory. It is inconceivable that 'restless children' managed to extent their wild game all over the region within a single day and to remain unnoticed. It is equally unbelievable that 'poisoners' repeatedly failed to kill or, even, seriously injure any of the two thousand of their targeted victims and, eventually, at the worst moment for themselves, when the vigilance was at its utmost and the police already alarmed, sent their 'commandos' to demonstrate their incompetence again.

One might argue that organizers kept events under their control and achieved their goals in Podujevo, but were unable to alter the fact that, along with rumours (desirable effect), a psychologically induced illness (unexpected effect) spread also through the social network [25, 26]. Even if that was the case, most patients fell victims of a mass psychogenic/sociogenic illness, thus disputing the poisonous gas theory.

According to Kosovo's Chief Epidemiologist [1], similar epidemics took place in the past, as well. The last one affected 30 children in a Kosovo high school in the same period of the year preceding this epidemic 15–21 March 1989).

A major difference between the two outbreaks was that the previous one had a shorter period of pending uncertainty about the causation: Two broken bottles with animals prepared in formalin were immediately blamed for the six day morbidity. Another difference was that a teacher fell victim of the Podujevo epidemic as early as on 19 March. A leader's disease, particularly in a school setting, makes subordinates much more likely to succumb [22, 27]. However, the decisive factor was a growing concern in the community between 19 and 21 March. It was apparently provoked by the teachers' own doubts, by their requests to the epidemiologists and the police to visit the school, and by the dismissal and non-attendance of classes.

The impact of all these events upon an ethnic group that already perceived itself as exposed to severe suppression can be readily understood. In consequence, a disaster plan for the self-defense of ethnic Albanians was put into effect on 22 March. It

relied upon the assumption of Albanian control over regular health services.

A more efficient organization of transport and admission of the patients was just one manifestation of the implementation of this plan. Non-Albanian doctors were puzzled to witness that in the Infectious Disease and Internal Medicine Hospitals, previously sparsely equipped with stretchers, dozens of them, similar to those used by health services, suddenly appeared [1, 5] and, later, equally unexpectedly disappeared [1].

Simultaneously, triage stations were established both on-site and in the hospitals' admission departments. Such stations in hospitals were staffed with people in white coats who were not hospital employees but took over the admission and emergency treatment. They administered infusions on their own and sent patients to the wards; attending physicians from the casualty departments later complained that they had been completely ignored [1, 10].

Within hospitals, a system of strict subordination was developed along ethnic lines. This by-passed even high non-Albanian professionals such as consultants and heads of units. In wards headed by non-Albanians, nurses from other wards administered treatment, paying no attention to the local staff and their protests [10].

The most conspicuous aspect of this parallel system of health care was an indiscriminate intramuscular application of atropine on-site and on admission. Within wards nurses in the Neuro-psychiatric Hospital deliberately applied atropine locally, defying required treatment ordered by attending physicians. With respect to legally prescribed treatment in this Hospital, ampoules of atropine were administered by some Albanian doctors, but much more restrictively. In two cases discussed in some more detail, parenteral application of this drug, combined with a corticosteroid, was claimed to have been effective [10].

A crucial point is that no patient was observed to have myosis. On the other hand, mydriasis was frequently mentioned, either as an isolated [6, 9, 10] or common finding [1, 5, 10]. Local doctors in Podujevo did not know the reaction to atropine, since the patients were immediately transported to hospitals [1], and Pristina doctors justified the use of this treatment by stating that it was an antidote [5]. However, none of them denied that mydriasis was a straightforward contraindication for atropine [10].

There can be no doubt that the use of atropine was a matter of doctrine applied to an emergency situation. This treatment had to be implemented rather than challenged. The controversy was only admitted when the outbreak was over [10].

Regarding the treatment of children with diuretics and corticosteroid, this practice has been recognized as medically unjustified in the report to the World Health Organization [12]. It would have been another

indication of strict observance of instructions pertaining to chemical warfare.

If poisonous gases are ruled out there is still a need to explain the mass morbidity of youth and the severe collective anxiety in the community. Likelihood of a psychological causation of the outbreak can be checked against a list of typical characteristics of mass hysteria [25, 28, 29]. These characteristics are as follows:

1. Preponderance of illness in preadolescents or adolescents: With a few exceptions, it was an epidemic of teenagers.
2. Prevalence of illness among girls or young women: As compared to males, females were twice as much affected.
3. Rapid spread with the apparent transmission of illness by sight or sound or both: From the moment that something unusual was suspected in one class, the outbreak almost momentarily expanded to two other classes at the same (ground) level of the school building. When the epidemic blew up from a localized 'explosive' form to a 'large diffuse outbreak' [22, 30], underlying mechanisms of spread were, of course, also changed. If transmission by sound and sight is understood to comprise the entire social network in a community, including newspapers, telephone contacts, etc., a nearly simultaneous spread of the outbreak from Podujevo to seven other areas of Kosovo within a single day is not surprising (diffuse outbreaks involve 'communities overwhelmed with false rumors and beliefs' [21]).
4. Presence of hyperventilation and/or syncope: In Ljubljana patients, clinical observation pointed to 'occasional hyperventilation giving an impression of impeded respiration' [6]. In all 26 cases for whom gas analyses were performed, a moderate or extreme increase of  $pO_2$  was found, while  $pCO_2$  was in the normal range. Hyperventilation was suggested as an explanation for this finding [6]. Patients elsewhere were not examined in this respect. Regarding syncope, a history of 'fainting' was recorded for some Ljubljana patients [6], while 'loss of consciousness' was observed in one ward of the Neuropsychiatry Hospital [10]. Also, it was a group fainting [1] that marked the beginning of the second wave of the epidemic.
5. Absence of laboratory results and physical findings that confirm an organic cause: All 153 samples were tested in the Military Medical Hospital using the most sophisticated techniques and equipment. These included thin layer chromatography, head space gas chromatography, high resolution gas chromatography with an NP detector and a library with 200 toxic substances, as well as gas chromatography-mass spectrometry with a library of over 42,000 substances. These tests proved to be negative for inhibited cholinesterase activity, increased concentration of methemoglobin and CO in blood, as well as for the presence of any other toxic substances [1]. Laboratories from Ljubljana [6] and Western Europe [2] also failed to detect any indications of possible poisoning. Neither locally nor elsewhere was a single result obtained which would challenge these findings. Clinically, there was no single group of patients with signs suggesting a specific organic cause.
6. Evidence of physical or psychological stress: Tension in the region was very high among all inhabitants. Concerning specific stresses affecting only high school students there was the decision of authorities to group Serbian and Albanian speaking children into separate classes. This was upsetting for Albanians and it was assessed by an Albanian doctor as a critical factor inducing the epidemic [5].
7. Rapid remission of symptoms: As mentioned already, a very rapid recovery was the rule. Major exceptions were the cases sent to Slovenia [6].
8. Occurrence in settings where children cluster: With a few exceptions, high schools were the only site of the epidemic.
9. Relapse of the same illness in the setting of the original outbreak: During their conversation with the Principal of Podujevo High School on 31 March, from nine to twelve days after the strange odours were reported, members of the Federal Commission were requested to meet a group of students. When they entered the classroom, two girls had 'attacks' with apparent convulsions. While the doctors tried to help, several other students developed similar clinical picture [1]. There are no such descriptions in the other reports.
10. Absence of illness in another group sharing the same environment: Not a single non-Albanian student or adult was affected. This feature of the epidemic appears to be the most indisputable one, since neither a doctor, nor a layman, including journalists in search for exceptions, ever challenged it. The consensus on the mononational pattern of the epidemic comprised both observers from outside and inhabitants of Kosovo, whatever were their interpretation of the causes of the epidemic.

It is clear that the natural history of mass casualty incidents in Kosovo fits very well into a framework of mass hysteria. The relapse of symptoms upon an exposure to settings of the original outbreak was the only one of 10 characteristics that did not have a regular or prevailing pattern. Assessment of the role played by meticulous collection of information on each case by the police [10] depends upon one's



preferences in selecting an explanation for the cause of the epidemic. However, some previous epidemics of mass hysteria show that 'recurrence' may be completely absent [24, 31].

Another characteristic that needs clarification is the rapid transmission of illness by sight or sound. During the period when the epidemic was localized, this criterion was met in a typical manner. On 22 March, when the illness rapidly spread all over the region, direct visual or auditory transmission was impossible. The fact that a similar symptomatology was present in cases with no previous contact, led some doctors to challenge the whole idea of non-physical causation of the outbreak [10]. Such a line of thinking ignores at least three arguments. First, the range of possible manifestations of mass hysteria is limited and in many non-related epidemics all over the world symptoms and signs were similar [22]. Second, mass hysteria follows a pattern of direct spread at its outset; later, however, when a critical mass of cases has been reached, a 'crowd reaction' follows [32]. This is independent of prior interpersonal or other direct ties. Third, transmission of symptoms through social networks may be indirect, involving spread of illness 'by proxy' [25, 33].

Apart of these general factors, the already discussed implementation of a community disaster plan must have been an important factor for the explosion of the number of cases. Epidemic hysteria is often perpetuated by the tension and stress of the emergency itself, with the response of social networks including the media and the medical community aggravating the situation [19, 21, 22, 33, 34]. A simultaneous involvement of both state authorized and unauthorized health care delivery systems was a peculiarity of the Kosovo epidemic making the situation more complex.

The main objection to accept the explanation involving psychogenic aetiology arises from the numerous examples of cases whose symptomatology was faked, or at least intentionally aggravated, as highlighted in several reports [1, 5, 12]. Doubts about the existence of any real departure from good health were also aroused by the liveliness of the cases soon after their admission to hospital. The Director of the Neuropsychiatry Hospital admitted that the noise and party-like atmosphere created by the victims of the epidemic prevented other patients from sleeping, although he denied media allegations that some previously admitted elderly patients left the hospital to find rest [10].

It would not be surprising if some of the thousands of teenagers who reported ill were just pretending. However, for an unbiased interpretation of all seemingly or actually contradictory information, as well as for an understanding of the role of different (particularly psychogenic vs. political) factors in the disease causation, some clarification of the very concept of mass or epidemic hysteria is needed.

Bartholomew [23] listed 75 terms used over the last 150 years to identify the sources of this condition. Many of them, containing descriptors such as 'psychosis' [35], 'madness' [36], 'psychotic' and 'folie' [37], as well as 'hysteria' [22, 27, 38], point to an overt psychiatric disorder. In practice, however, there is little evidence that more than a tiny proportion of all cases, if any, are mentally ill [23, 26, 39].

An absence of psychiatric disturbances in most cases, particularly if the sociocultural context is taken into account, led some authors to name the condition 'epidemic' [40] or 'mass psychogenic illness' [41, 42], as well as 'mass sociogenic illness' [20, 43]. The term 'collective exaggerated emotions' was also suggested, with the point that researchers examining such episodes 'should focus not on the behavior but on the stimulus for the exaggerated emotions which became self-fulfilling, and the relation of the stimulus to the participants world-view' [23], since 'mass hysterias represent culture-specific idioms of negotiation, covert political protest, deviant social roles, rituals, and the psychosomatic consequences of particular world-views or cultural contexts' [44].

In the most comprehensive recent review of theories used to explain the condition [45], two were paid a particular attention to: hoax/fraud ('conscious deception for social gain'), and sick role ('unconscious attainment of such benefits as social recognition and attention').

One could hardly ignore these observations or deny the crucial importance of the social context and perceived reality which is socially constructed [46]. However, even when an epidemic takes place in a conflictless community [31], the authors find unfeasible to assess beliefs and world-views of the participants due to the authorities' fear of recurrence [47]. The difficulties become much more serious in a divided and conflict ridden population, as exemplified by the West Bank epidemic [21] which was left very poorly explained (As the authors put it then: 'Last, in spite of the fact that a good number of cases were in all probability nonfactitious, it is not totally implausible that others were indeed factitious').

An attempt to explain the Kosovo epidemic is bound by similar problems. Several facts are apparent. First, in terms of the number of cases, it was an unprecedented event involving four times more patients than the largest similar epidemics in the recent past [21, 24]. Second, the single most decisive factor that set the stage for the outbreak was the severe tension between the two ethnic groups; it was an epidemic in waiting. Third, the epidemic was preceded by an increased frequency of respiratory infections, which acted as a trigger. Fourth, neither the course of the epidemic, nor the symptomatology could point to any specific physical agent.

What remains obscure in terms of aetiology is the possible interplay of psychogenic and purely political factors. As shown above [45], there is a tendency



to view these factors as interdependent. Still, for the sake of clarity, in the concluding remarks we prefer to hold to the classical definition of mass hysteria (allowing for the inappropriateness of the term itself), as 'the occurrence in a group of people of a constellation of physical symptoms suggesting an organic illness but resulting from a psychological cause' [28]. We conclude that most cases satisfied this description. No doubt that, once it occurred, the epidemic was used for political gains but it is not likely that the whole event was planned in advance.

### Final comment

Since the time of this epidemic, mistrust has further deepened between the two nations and between their respective medical communities. In the gruesome epidemiological situation, aggravated by the international sanctions imposed upon Yugoslavia, Kosovo's health services fail to cope even with everyday problems. Any future serious threat would reveal all the problems and potential conflicts in a much more drastic way than four years ago.

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*Address for correspondence:* Professor Zoran Radovanovic, Department of Community Medicine & Behavioural Sciences, Faculty of Medicine, P.O. Box 24923, 13110 Safat, Kuwait  
Phone: (965) 5319485; Fax: (965) 5318454