Seasonality in Vestibular Disorders

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Abstract: Our objective in this study was to evaluate a causal relationship between vestibular pathological findings and climatic variations during the year (summer, autumn, winter, and spring). The study was conducted in a Brazilian clinic located in a tropical climate and having well-defined warm and cold weather. For this retrospective study, our outpatients were the subjects, and the diagnosis was made on the basis of clinical (ear, nose, and throat) and electronystagmographic evaluation. Data were collected, matched with the year's seasons, and analyzed for significance statistics. We found no significant differences among the illnesses in relation to the climatic seasons. We concluded that a correlation did not exist between annual seasons and vestibular disorders in our environment.

Key Words: prevention; seasonality; vestibular diseases; viral

Seasonal cycles of several human illnesses, such as infectious diseases, stroke, and cardiovascular and respiratory diseases, could be attributed variously to changes in atmospheric or weather conditions in many countries. For example, respiratory human pathogens recur in wintertime, probably owing to cold air and low humidity [1]; seasonal changes in stroke mortality have been associated with seasonal variation in both respiratory disease and temperature [2,3]; and physiological changes seem to influence infectious diseases (although many unexplained features, such as melatonin, attend this case). We sought to determine whether some evidence exists of climatic changes to peripheral vestibulopathies or of some worsening of preexisting labyrinthine diseases relative to seasonal changes annually.

Statistics regarding vestibular diseases have been reported in relation to age, gender, and illness distribution in a few studies: Mizukoshi et al. in 1988 [4]; Katsarkas in 1994 [5]; Maudonnet et al. in 1998 [6]; and Uno et al. in 2001 [7]. However, none of them correlates seasonality with dizziness. The aim of our study was explore a correlation between annually occurring seasons and vestibular diseases and the possible consequences of any such connection.

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PATIENTS AND METHODS

In this retrospective study, we observed 6,865 patients in our outpatient clinic. We studied recordings from both genders over the period from 1997 through 2000; ages ranged from 4 to 91 years. Complaints included dizziness, tinnitus, or hearing loss (or a combination). These patients underwent a clinical and audiometric evaluation and a computerized electronystagmographic measurement. The findings were classified according to season. From the original pool of 6,865 patients, we excluded 830 patients because their diagnosis was inconclusive, leaving a total of 5,645 subjects.

The weather in Brazil, where we conducted our research, is rainy tropical, and we have well-defined periods of wet and dry, with rainy, warm, cold, and dry seasons. We wondered whether and how these weather factors influenced vestibular illnesses. The distribution of our annual seasons is as follows: Summer runs from December 21 through March 20, autumn from March 21 through June 20, winter from June 21 through September 21, and spring from September 22 through December 20.

The data gleaned from our study, which matched diagnosis with annual seasons, were submitted to Tukey's studentized range, and the difference among the sample rates proved to be significant ($\alpha = .05$). We did not find significant statistical difference among seasons considering the significance level of $\alpha = .05$.

RESULTS

The vestibular illnesses that we noted in our patients included cervical and central disorders, Ménière's disease, metabolic disorders, migraine, otosclerosis, vascular disorders, and vestibular neuritis.

Table 1. Disease Distribution by Year in Summer

Diagnosis	1997	1998	1999	2000
Autoimmune diseases	0	0	1	2
Central disorders	5	1	2	0
Cervical disease	66	32	55	41
Degenerative diseases	0	1	3	2
Dysfunctional auditory tube	0	1	5	0
Epilepsy	0	1	0	0
Facial palsy	1	2	3	0
Infectious diseases	0	0	2	0
Ménière's disease	0	16	0	0
Metabolic disorders	42	25	38	42
Migraine	51	37	30	31
Motion sickness disease	0	0	0	0
Normal ENG	44	71	52	77
Otosclerosis	16	9	9	11
Ototoxicity	3	4	2	0
Postural vertigo	8	1	5	1
Sudden deafness	9	6	5	3
Sudden deafness and dizziness	0	0	5	1
Trauma	8	7	9	8
Vascular disorders	74	51	69	68
Vestibular neuritis	5	3	5	3
Total	332	268	300	290

ENG = electronystagmography.

Table 2. Disease Distribution by Year in Autumn

Diagnosis	1997	1998	1999	2000
Autoimmune diseases	2	0	1	0
Central disorders	5	2	3	0
Cervical disease	43	67	66	74
Degenerative diseases	0	0	1	2
Dysfunctional auditory tube	0	3	1	2
Epilepsy	0	1	1	0
Facial palsy	4	1	2	1
Infectious diseases	2	3	2	1
Ménière's disease	2	15	1	0
Metabolic disorders	52	41	39	59
Migraine	64	57	32	23
Motion sickness disease	1	1	1	0
Normal ENG	83	68	65	98
Otosclerosis	10	11	3	14
Ototoxicity	2	1	1	1
Postural vertigo	4	0	2	1
Sudden deafness	6	4	4	6
Sudden deafness and dizziness	0	2	0	0
Trauma	16	11	15	14
Vascular disorders	90	71	69	77
Vestibular neuritis	10	4	1	2
Total	396	363	310	375

ENG = electronystagmography.

The data were organized into tables according to their distribution by year and season (Tables 1–4). Other diseases (presbycusis, facial palsy, sudden deafness, trauma, motion sickness, dysfunctional pharyngotympanic [auditory] tube, epilepsy, autoimmune diseases, and vestibular degeneration) also were found,

Table 3. Disease Distribution by Year in Winter

Diagnosis	1997	1998	1999	2000
Autoimmune diseases	0	1	0	1
Central disorders	3	2	2	0
Cervical disease	58	81	57	57
Degenerative diseases	0	0	2	5
Dysfunctional auditory tube	0	2	0	6
Epilepsy	0	0	0	0
Facial palsy	1	4	4	3
Infectious diseases	1	0	1	1
Ménière's disease	0	16	0	0
Metabolic disorders	49	31	42	40
Migraine	65	31	47	38
Motion sickness disease	1	3	1	1
Normal ENG	85	62	65	84
Otosclerosis	15	10	7	10
Ototoxicity	3	1	2	4
Postural vertigo	1	2	4	1
Sudden deafness	8	6	4	11
Sudden deafness and dizziness	0	0	0	0
Trauma	21	4	16	14
Vascular disorders	73	80	57	63
Vestibular neuritis	5	4	6	3
Total	389	340	317	342

ENG = electronystagmography.

Table 4. Disease Distribution by Year in Spring

Diagnosis	1997	1998	1999	2000
Autoimmune diseases	0	0	1	0
Central disorders	6	1	0	1
Cervical disease	55	81	81	54
Degenerative diseases	0	4	0	2
Dysfunctional auditory tube	0	0	1	0
Epilepsy	0	0	0	0
Facial palsy	2	2	4	0
Infectious diseases	1	3	3	2
Ménière's disease	4	11	0	0
Metabolic disorders	33	25	53	53
Migraine	42	33	49	27
Motion sickness disease	0	2	3	0
Normal ENG	68	57	51	76
Otosclerosis	12	9	5	7
Ototoxicity	7	1	2	1
Postural vertigo	3	2	5	1
Sudden deafness	6	3	10	6
Sudden deafness and dizziness	0	0	0	0
Trauma	17	17	15	24
Vascular disorders	70	82	70	77
Vestibular neuritis	1	4	2	3
Total	327	337	355	334

ENG = electronystagmography.

Table 5. Other Diseases (n = 343 patients) Distributed by Year and Season

	Summer				Autumn				Winter				Spring			
Other Diseases	'97	'98	'99	'00	'97	'98	'99	'00	'97	'98	'99	'00	'97	'98	'99	'00
Barotrauma		2														
Brainstem lesion				1												1
Carotid disorders		1				3		1		7		2				4
Cerebellopontine angle lesion				1												1
Cochleovestibulopathy										1						
Conductive deafness		4				3	1			3	4			3	1	
Congenital disorder			1		1		1			2			1		1	
Cortical lesion												1				
Ethylic intoxication														1		
Meningitis		1														
Myasthenia			1													
Neurinoma (schwannoma)	1		1	1	1	5	2	7	5	5		2	2	3	6	4
Otuloses					1	1		1								1
Panic disorder													1			
Peridural complications		1				6			1					13		
Presbyvestibular disorder	11	12	4	9	8	9	4	12	20	12	14	10	17	7	6	14
Psychiatric disorder									1							
Surgery sequelae						1								1		
Temporomandibular joint dysfunction	3				2		2	4	2		2	3	1	3	3	2
Vascular stroke												1				
Vertebrobasilar insufficiency	1			1	1		5	1	1	4	5			2	1	2
Vestibular immaturity										1						

though less frequently. Data for these disorders are presented separately, because their incidence was lower (Table 5). In some patients, electronystagmographic results were normal.

Then the data were submitted to a technical analysis of variance using Tukey's studentized range (HSD) distribution for multiple comparison (variance level, $\alpha = .05$; Table 1). The data analysis showed no significant difference among these tests, among the various patient groups, and among the diseases in the different seasons by year. Data for each year's seasons were submitted to statistical analysis, as were data for each disease group, and were compared to each other (the same season—for instance, summer to summer) in each year.

DISCUSSION

The aim of this study was to determine whether a correlation exists among vestibular diseases and climatic variations. Because our climate is marked by well-defined dry and wet periods, we sought to learn whether the weather could relieve or, in some cases, worsen certain seasonal disorders.

A few recent epidemiological studies have investigated vestibular disorders, but we did not find any that correlated weather and disease distribution. Our review shows that most of them are restricted to studies about age, gender, and diagnosis [5,6,8,9] or about the disease [7,10,11].

In postmortem examinations of the brain and temporal bones of patients with vestibular neuritis, Baloh et al. [12] showed the loss of hair cells and an "epithelialization" of the utricular macula and semicircular canal cristae; that is, the cochleovestibular organs suffer with the entire process. This study presented the first description of deafferentation in vestibular organs.

Conraux [11] also reminded us that neuritis can damage the vestibular apparatus, and therefore we need to be able to diagnose and control the disease.

We begin to consider that vestibular neuritis is an entity that could be related to the increase of influenza and other upper respiratory tract infections or other viruses (e.g., gastrointestinal viruses [13]). Following this line of thinking, the next step, once the causal nexus has been confirmed, will be to elaborate the manner in which the infections exactly match with climate, in order to detect them and create prevention strategies, to increase accessibility to the adjusted treatment, and to develop efficient prevention methods such as vaccines (if such is possible), thus introducing the correct "medicine" at the correct time. Because we live in a developing country, we think first in terms of health prevention and, in fact, our focus should be in primary care, wherein therapeutic and preventive implications may be considered.

Although the etiological diagnosis of vestibular diseases remains uncertain, perhaps the discovery of an association between seasonality and some disorders should help us to prevent such illnesses and to prescribe earlier treatments. However, our study did not show any correlation in the data collected and analyzed by Tukey's studentized range (HSD) distribution.

CONCLUSION

Whereas, in fact, a correlation between seasonality and some determined complaints or illnesses does exist, the discovery of such findings in neurootology remain a distant reality. In this study, we found no evidence of a correlation between annual seasons and vestibular disorders in our environment. We recognize our limitation to carry out this study and note that many further studies will be needed to elucidate this proposition.

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