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Herpes zoster laterality and handedness: Is there any relation?

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Abstract

Background: Herpes zoster (HZ) is classically unilateral in its presentation appearing along the distribution of the cranial or spinal sensory nerves, with an occasional spill into the neighbouring dermatomes. An observation that many patients of facial herpes zoster have predominantly left sided involvement led us to validate further if any significant association of herpes zoster really occurs with cerebral dominance and handedness of the individuals.
Aims & Objectives: To see any correlation between handedness of individual and laterality of facial herpes zoster and to compare it with extra-facial herpes zoster.
Material & Methods: All the patients with clinically diagnosed herpes zoster presenting to the dermatology outdoor or admitted in indoor of a tertiary care centre were included in this study during a period of year from January 2017 to December 2018. Clearance from institutional ethical committee was taken.
Results: Out of a total of 191 patients, males 105 (55%) outnumbered females 86 (45%) with a male: female ratio of 1.22. Maximum number of patients were between 20 and 40 years (67;35.08%). The right-handed individuals accounted for 89.53% of the total cases. A higher number of right-handed patients manifested HZ on the left side (55.56%). Of the left-handed, 50% manifested HZ on the right side. Statistical analysis with Fisher's test revealed a two-tailed $P = 0.637$ showing a statistically insignificant involvement of the contralateral side in HZ compared to hand dominance. These values for facial and extra-facial HZ were 0.9 & 0.09 respectively. This is in contrast to older studies which found significant correlation between hand dominance and contralateral side of involvement in herpes zoster.
Conclusion: Cerebral dominance plays an important role in neuro-immunomodulation, as reflected in previous studies, but our study did not find any significant association between hand dominance and contralateral eruption of HZ.

Key words: Herpes zoster; handedness; laterality; cerebral dominance

Introduction

Herpes zoster (HZ) is a common viral infection, strictly dermatomal in distribution. A high

density of varicella zoster virus in the ganglia innervating the skin with the highest number of cutaneous lesions of varicella (mostly in the distribution of ophthalmic division of trigeminal nerve and sensory spinal ganglia from T1 to L2) causes HZ to occur with a relatively higher frequency in these dermatomes [1]. Cause of the strict unilaterality is not exactly known. An observation that many patients of facial HZ have predominantly left sided involvement, led us to validate further if there is any significant association of HZ with cerebral dominance and handedness of the individuals, and whether there is any difference in such association between facial and extra-facial HZ.

Materials and Methods

An observational case-control study was conducted over a period of 2 years. Patients coming with the clinical diagnosis of facial herpes zoster to the dermatology out-patient department or admitted in indoor of Maharana Bhupal Hospital, Udaipur, and Rajasthan, India were included in the study. Almost equal number of extra-facial herpes zoster were recruited for comparison of hypothesis for both facial and extra-facial zoster.

Results

Out of the total 191 subjects included 105 (55%) were males, 86 (45%) were females with a male: female ratio of 1.22. Facial zoster contributed to 40.84% of cases while 59.16% cases had extra-facial zoster. Maximum number of patients were between the age of 20-40 years (65, 34.03%), followed by 41 to 60 years (61,31.94%), > 60 years (46, 24.08%) and the least affected age group was ≤ 20 years of age (19, 9.95%). In most of the patients (83.25%) the duration of skin lesions was one week or less, and almost all (97.38%) experienced pain of varying character, including allodynia, burning, throbbing, itching, stretching, pin prick to dull ache. Systemic symptoms were present in 21.99% patients and co-morbidities in 36.65% patients. Out of 78 (40.84%) cases of facial zoster, ocular and oral mucosa was involved in 34.62% and 28.21% cases respectively. Only 15.71% patients had history of varicella in past whilst most of them (78.01%) couldn't recall any such history and it was absent in 6.28% cases. Detailed clinical characteristics of patients are given in table.

Table 1: Detailed clinical characteristics of patients

Age groups (years)	Male		Female		Total	
	No.	%	No.	%	No.	%
≤ 20	12	11.43	7	8.14	19	9.95
21-40	40	38.10	25	29.07	65	34.03
41-60	28	26.67	33	38.37	61	31.94
>60	25	23.81	21	24.42	46	24.08
Total	105	100	86	100	191	100
Handedness						
Right	96	91.43	75	87.21	171	89.53
Left	9	8.57	11	12.79	20	10.47
Total	105	100	86	100	191	100
Involved side						
Right	50	47.62	36	41.86	86	45.03
Left	55	52.38	50	58.14	105	54.97
Total	105	100	86	100	191	100
Involved part						
Facial	37	35.24	41	47.67	78	40.84
Extra-facial	68	64.76	45	52.33	113	59.16
Total	105	100	86	100	191	100

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Duration of skin lesions						
≤ one week	87	82.86	72	83.72	159	83.25
> one week	18	17.14	14	16.28	32	16.75
Total	105	100	86	100	191	100
Pain duration						
≤ one week	76	72.38	62	72.09	138	72.25
> one week	25	23.81	23	26.74	48	25.13
No pain	4	3.81	1	1.16	5	2.62
Total	105	100	86	100	191	100
Type of pain						
Uni-character pain	55	52.38	36	41.86	91	47.64
Combination of symptoms	24	22.86	16	18.60	40	20.94
Dull aching	22	20.95	33	38.37	55	28.80
Asymptomatic	4	3.81	1	1.16	5	2.62
Total	105	100	86	100	191	100
Associated with pruritus	23	21.90	14	16.28	37	19.37
Systemic symptoms						
Present	24	22.86	18	20.93	42	21.99
Absent	81	77.14	68	79.07	149	78.01
Total	105	100	86	100	191	100
Co-morbidity						
Present	36	34.29	34	39.53	70	36.65
Absent	69	65.71	52	60.47	121	63.35
Total	105	100	86	100	191	100
Eye involvement						
Present	13	35.14	14	34.15	27	34.62
Absent	24	64.86	27	65.85	51	65.38
Total	37	100	41	100	78	100
Oral involvement						
Present	7	18.92	15	36.59	22	28.21
Absent	30	81.08	26	63.41	56	71.79
Total	37	100	41	100	78	100
H/O Varicella						
Present	14	13.33	16	18.60	30	15.71
Absent	8	7.62	4	4.65	12	6.28
Couldn’t recall	83	79.05	66	76.74	149	78.01
Total	105	100	86	100	191	100

Right-handed patients (171/191, 89.53%) manifested HZ more on the left side (95/171, 55.56%). Of the left-handed (20/191, 10.47%), 50% (10/20) manifested HZ on the right side (figure). Statistical analysis with Fisher’s test revealed a two-tailed P = 0.637 and was statistically insignificant when comparing involvement of the contralateral side in HZ to hand dominance, though the absolute values showed marginally higher involvement of contralateral side to handedness. These values for facial and extra-facial HZ were 0.9 & 0.09 respectively.

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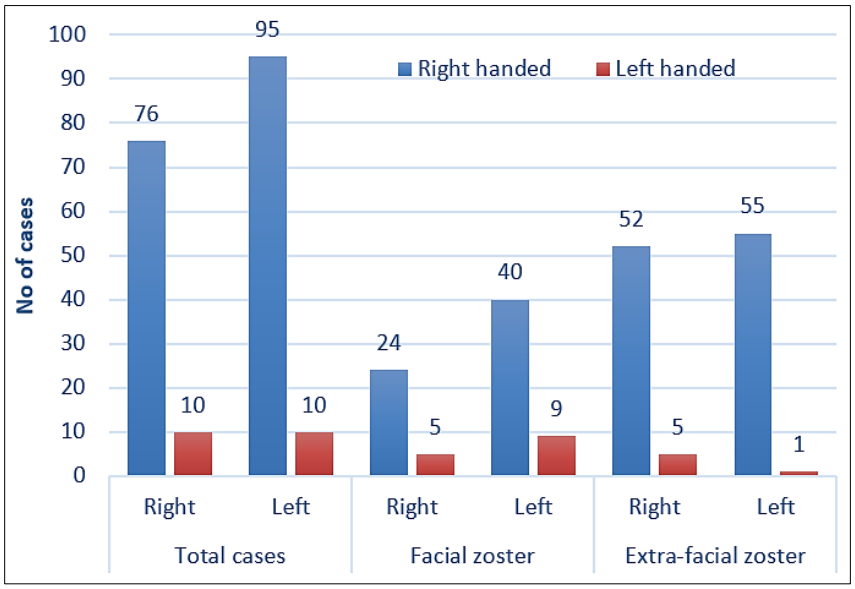

Fig 1: Graph showing relation between handedness and herpes zoster side

Discussion

Herpes zoster has so far been described as the disease of dermatomal distribution which is due to highest density of varicella zoster virus in ganglia innervating the skin with highest number of cutaneous lesions of varicella, which is mostly in distribution of ophthalmic division of trigeminal nerve and sensory spinal ganglia from T1 to L2. Cause of strict unilaterality (except in few cases such as disseminated zoster or immunocompromised state) is not exactly known. Studies have shown stronger cell mediated immunity on non-involved side than involved side in HZ and on the left side of body than right side in normal subjects [2, 3].

Two different examples were used to be quoted in past that CNS works asymmetrically to modulate immune functions. First, an animal (mouse) experimental study suggested that central nervous system works asymmetrically in modulating immune functions and showed that ablative lesions of left cortex result in decreased cell mediated immunity while ablation of right cortex had none or even immune enhancing effects [4]. Second, researchers Geschwind and Behan described interesting relationship between left-handedness and the incidence of various disorders [5].

One report had shown increased frequency of herpes zoster in right-handed subjects than normal healthy controls along with higher involvement of left side of the body in females in comparison to male patients [6]. This is in consistence with our findings which showed significantly higher number of right handed subjects (n=171, 89.53%) in comparison to left handed ones but we did not compare this with normal healthy control population. Involvement of left side of the body was seen in 58.14% females and 52.38% males, slightly higher in females in comparison to males though statistically insignificant [6].

Study by Arora *et al.* [7] showed preferential involvement of contralateral side by herpes zoster in comparison to the handedness and results were statistically significant. In contrast, our study did not show any such correlation which might be due to smaller sample size.

Although we started this study after noticing predominant involvement of left side of face, which was strengthened by unique innervation of facial nucleus in pons which leads to contralateral lower facial palsy in upper motor neuron (UMN) lesions and ipsilateral palsy of both upper and lower face in lower motor neuron (LMN) lesions, it was not reflected in the results.

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Conclusion

Though cerebral dominance plays an important role in neuroimmunomodulation, as reflected in previous studies, our study did not find any significant correlation of hand dominance and contralateral eruption of HZ. This may in part be due to smaller sample size. Larger scale case control studies aided by complex investigations showing neural & immunological signalling changes will be needed to validate the hypothesis.

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