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Seasonal variation in childhood guillain-barre syndrome in central India

Abstract

Objective: Recognizing the seasonal and monthly variation of Guillain Barre syndrome.

Design: Retrospective observational study.

Setting: Pediatric wards and Pediatric Intensive Care Unit.

Methodology: A medical record files of 52 patients of GBS, between the periods of May 2011 to April 2016 were recovered from Medical Record and Statistics Section of institute. Files were analyzed for demographic data, antecedent's factors, time of occurrence with respect to months & seasons and data was analyzed.

Result: In our series females are outnumbered to male and most of the cases in age group 6-12years, 46.15% were belongs to lower socioeconomic status. In 51.92% cases, antecedents were present at the beginning of clinical picture and upper respiratory tract infection (26.84%) & diarrohea (18.23%) were noted. The highest incidences of Guillain Barre Syndrome 48.08% cases were seen in monsoon, 21.15% in summer, 13.46% in post monsoon and 17.31% in winter season. Though the syndrome occurred sporadically throughout the year, the month wise peak was highest in month June followed by July.

Conclusion: Seasonal and monthly variation of childhood Guillain Barre syndrome differs from adult GBS and it is most commonly in monsoon season.

Keywords: childhood guillain barre syndrome, seasonal variation, antecedent factors, GBS, prodromal infections

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Introduction

With the reduction of poliomyelitis Guillain Barre Syndrome has become the most common cause of acute flaccid paralysis in both developed and developing countries with an incidence 0.9-1.1 cases per 100000 children below 15 years of age.[1,2] A common misconception is that the GBS has a good prognosis- but up to 20% of patients remain severely disabled and approximately 5% die, despite immunotherapy.[3] Guillain Barre Syndrome is an immune mediated disorder of the peripheral nervous system which is triggered by either infectious or noninfectious factors.[4] Approximately 70% of cases occur 1-3 weeks after an acute infectious process. The organisim thought to be involved are campylobacter jejuni, Mycoplasma pneumonia, Haemophilus influenza, Cytomegalovirus, Epstein-Barr virus.[5]

Evidence for seasonal variation in GBS incidence has been contradictory, with some studies suggesting a winter peak,[6,7] some studies finding no significant variation and some reporting summer, spring or autumn peak.[8] The cause of this heterogenicity has not been systematically assessed, but has been interpreted either as demonstrating no seasonal variation or demonstrating difference in regional geographic factors. There is paucity data regarding seasonal variation and occurrence of childhood GBS in India.

During our clinical practice, it was observed that there was clustering in the occurrence of GBS cases during certain seasons and months of the year. So this retrospective study was carried out to know the seasonal occurrence and monthly variation of childhood Guillain Barre Syndrome.

Material and methods

This series of patient with Guillain-Barre syndrome were retrospectively studied at one of the largest tertiary care & referral hospital that provide care to underprivileged, socioeconomically deprived population of central India from May 2011 to April 2016. The medical records were recovered by the medical case files from the Medical Record Section and Statistical Service of the institute and the information was collected to conform to a pre-established protocol after approval from institutional ethical committee. The medical records were analyzed for the demographic data, socioeconomic status, antecedent's factors and time of occurrence with respect to months and seasons. The seasons in India were divided as summer: March to May; Monsoon: June to September; Post monsoon: October to November; winter: December to February according to seasonal classification of Indian Meteorological Department.[9] We classified our patient according to Modified Kuppuswamy's Socioeconomic Scale into Lower, Middle and Upper socioeconomic class.[10] We calculated outcome in form of occurrence of with respect to seasonal and monthly variation.

Statistical analyses

The data regarding the numerical variables were summarized through average, medium and deviation pattern. Categorical data were summarized and presented inform of frequency. The frequencies comparison between the seasonal variations was accomplished by the Chi squre test. The $P<0.05$ was considered significant.

Results

Total 52 cases were enrolled from May 2011 to April 2016, amongst that 25(48%) were male and 27(52%) female with sex ratio 0.92:1 without significant difference between two sexes. The age of onset varies from 9 months to 12 years with mean age 5.76 years. A 24(46.15%) cases were belonged to lower socioeconomic class while 21(40.38%) were middle class and 7(13.40%) from upper socioeconomic class.

Table 1 Age and sex wise distribution of cases

Age Group	Sex		n=52, (%)
	Male	Female	
Infancy	1	0	1(1.92)
1 year- 3 years	7	11	18 (34.62)
3 years -6 years	8	4	12 (23.08)
6years -12 years	11	10	21 (40.38)

Table 2 Seasonal trends over a 5 year period

Season	Number of Cases Over 5 Years (n=52)	Percentage %	Significance
Summer	11	21.15	Chi squre test of homogeneity (P<0.005)
Monsoon	25	48.08	
Post Monsoon	7	13.46	
Winter	9	17.31	

Table 3 Seasonal trends from different studies

Study Group	Summer (%)	Monsoon (%)	Post Monsoon (%)	Winter (%)
Present study	21.15	48.08	13.46	17.31
Mathew et al.[19] (South India)	23.59	32.39	17.6	26.4
Sriganesh et al.[27] (South India)	33.54	25.8	22.58	18.06
Sharma G et al.[20] (North India)	41.53	29.23	12.3	16.92
Sudulagunta et al.[14] (India)	20.75			41.5
Zaheer M et al.[22] (Pak)	64	26.5		
Yaqoob et al.[28] (Pak)	8.82	32.4	32.4	26.5
Akbaryram et al.[29] (Iran)	40	20	32	8
Wu et al.[12] (China)	51.7		13.9	9.6
Haghighi et al.[30] (Iran)	23.13		29.05	29.56

The Presence of antecedents at the beginning of the clinical picture was referred in 27(51.92%) cases; among them, the most frequent was upper respiratory tract infection (26.84%), followed by diarrohea (18.23%).

The highest incidence of Guillain Barre Syndrome cases 48.08% were seen in monsoon and 21.15% were in summer (Figure 1). The occurrence of cases in monsoon as compared to summer was statistically significant (Table 1& 2). Though the syndrome occurred sporadically throughout the year, the month wise incidence was highest in June followed by July (Figure 2).

Discussion

Guillain-Barre syndrome was defined more than a century back but the seasonal variation in children from different studies are not consistent, which might be due to geographical and racial diversity, even they differ in pediatric GBS differ from that in adult ones.[11,12] Limited data is available on seasonal variation in childhood GBS, hence the data from pediatric cohort is separately evaluated. We bring a result of retrospectively collected data on seasonal variation in Indian children. In our study females are outnumbered to male as though it has been shown in various studies that there is a small predominance of male in occurrence of GBS cases[2,5] but van der Linden reported females are outnumbered to male in their study.[13] In childhood it is usually occurs after the age of 3 years.[13] In this series, the age varied from 9 months to 12 years and more commonly in the age group 6 years to 12 years, similar distribution of age was reported by Wu X et al.,[12] in their study. Socioeconomically most of our cases (46.15%) from lower class and 40.38% were from middle class. Such a high occurrence of GBS in our series might be because of our institute served to socioeconomically deprived population and might be the incidence of infections are more common in such socioeconomic class A previous infection should always be searched particularly when trying to define the presence of some agents more frequently related to GBS. In 51.92% of cases of this series there was a report of clinical events before the first symptoms of GBS. Among these events the most frequent was unspecific upper respiratory tract infection followed by diarrohea. Most of the studies in literature noted that antecedent's factors associated with occurrence of GBS and most commonly URTI and diarrohea.[14,15]

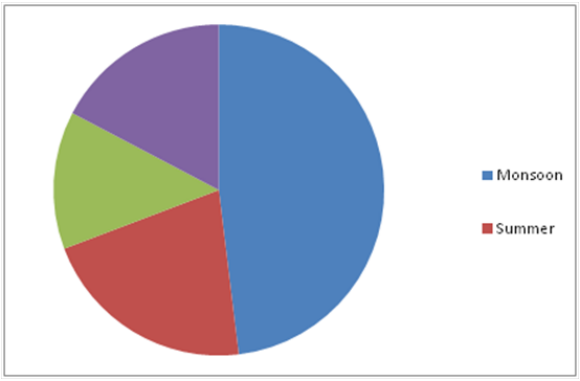

Figure 1 Seasonal trends of GBS cases.

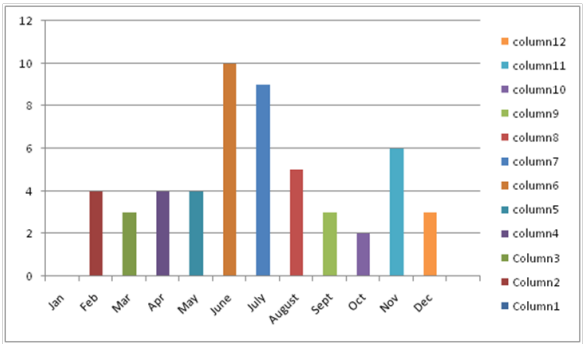

Figure 2 Month wise Distribution of GBS cases.

Although the Guillain Barre Syndrome occurred throughout the year long sporadically with peaks reported at different seasons, most of the studies noted seasonal variation in their studies.[16] Seasonal variation may be dependent on seasonality in the precipitating illness, which is thought in some cases to cause cross-reactivity with molecular epitopes on peripheral nerves.[5,14,17,18] In our study, seasonal variation in occurrence of cases is noted, 48.08% cases were seen in monsoon followed by 21.15% in summer, 13.46% in post-monsoon and 17.31% in winter season. Such a high incidence of cases in monsoon might be because of high chance of infection in low socioeconomic class. Similar types of observation 32.39% in monsoon and 23.59% in summer were revealed by Mathew et al from south India.[19] But in contrast to our result, studies from north India Sharma G et al.,[20] (Rohtak) reported peak seasonal clustering in summer followed by spring season while Sharma A et al.,[18] (Chandigarh) observed C. Jejuni positive cases mainly in winter season and was often associated

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with axonal variety of GBS. Studies from in and around Delhi showed influenza virus circulation peak coincided with rainy and winter season.[21] Peak summer clustering has been reported by Zaheer M, Hughes et al & Ho et al.,[23-25] Wu et al.,[12] (Northern China), Islam et al.,[25] (Bangladesh) from nearby countries while peak clustering of GBS cases in the winter season has been reported from studies done primarily from Western Hemisphere.[7,16,17,26] A comparison of the seasonal trends reported from various studies given in Table 3.

Monthly variation is well documented in most of the studies. In our study, month wise peaks were seen in month June to August (46%) and nearly equal cases in month March to May and October to December but no case observed in month January. Study done by Mathew et al observed month wise peak in June to September and second peak in November to January.[19] Similarly Wu et al from China reported higher incidence of cases in July and August and was significantly higher in children compared to adults.[12] In contrast to our finding Sharma G et al.,[20] revealed month wise peak in month May and July and another peak was in February.[20] A recent study from south India, which observed the seasonal variation in the clinical recovery of cases with GBS requiring mechanical ventilation, showed increase occurrence of GBS during the months of June to August and December to February which is consistent with our seasonal and monthly peaks.[27]

There is no epidemiological data on the epidemiology of infectious agents proposed to trigger of GBS cases in pediatric population from our country. So we could not suggest a possible link between an outbreak of any causative organisim and our seasonal and monthly variation but there is substantial documentation on adult population from India and western literature to comment association between infectious agents like C. Jejuni and influenza like diseases trigger of GBS.

Conclusion

Seasonal and monthly variation of childhood GBS differ from adult GBS. Though the syndrome occur sporadically throughout the year, most commonly it was observed in monsoon (48.08%) followed by summer (21.15%) and the month wise peak was in June to August in our study.

Implication

This may have public health implication in the future for identifying prodromal infections that could be prevented to reduce the incidence of GBS in specific seasons. It also has some potential implication that targeted GBS education of primary care physician, front line hospital staff and resource manager in high frequency period might help to reduce adverse outcomes among the seasonal excess of GBS admission and offers a potential opportunity to intervene at the population level to reduce mortality and morbidity associated with GBS.

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None.

Conflicts of interest

Authors declare that there is no conflict of interest.

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