



“CAUSES OF NON-POLIO ACUTE FLACCID PARALYSIS IN CHILDREN RESIDING IN THE PROVINCE OF SINDH”

ABSTRACT:

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OBJECTIVE: To determine the frequency of the causes of non-polio acute flaccid paralysis in the paediatric population of Sindh.

STUDY DESIGN: descriptive/ cross sectional survey.

SETTING: it is a community based study carried out in all the districts of the province of Sindh from the year 2000 – 2009

METHODOLOGY: The study included all cases of acute flaccid paralysis (AFP) aged 0- <15 years, residents of Sindh who were picked up during the active AFP surveillance of the community as a part of polio eradication initiative. AFP was diagnosed clinically through history and examination as per definition of the WHO. Stool examination for viral isolation was done in all cases while appropriate laboratory tests including serum electrolytes, cerebrospinal fluid (CSF) examination electrophysiological and radiological studies were done in most cases where required. The final diagnosis was based on the available clinical data, vaccination history, epidemiologic data for the province/ district and laboratory results. Data were analyzed using EPI Info V2 of windows. Results were described in frequencies / percentages.

RESULTS: A total of 7891 cases of AFP were reported during the study period. 7555 cases were diagnosed as non-polio AFP. The most common cause of non-polio AFP identified in this series was GBS (21%) closely followed by hemiplegias and encephalitis / meningitis present in 20.7%, 7.06% of cases respectively. 35.7% of cases consisted of miscellaneous causes not coded by the WHO for line listing. The analysis of the other causes of non-polio AFP revealed that the group of problems related to the peripheral nervous system (PNS) topped the list followed by joints and central nervous system disorders. The comparison of the other causes of non-polio AFP before and after the introduction of the liberal policy for AFP surveillance showed the increased reporting of pseudoparalysis specially related to the skeletal system rather than the true acute flaccid paralysis. The age group affected most by AFP belonged to 0 - < 5 years (71%) with 2-< 5years being the group affected most.

CONCLUSION: The study confirms GBS as the most common cause of AFP in the <15 years population of Sindh. The reporting of cases having pseudoparalysis is quite high.

KEY WORDS: Acute Flaccid Paralysis, poliomyelitis, Guillain Barré syndrome, Transverse myelitis, Hemiplegia.

INTRODUCTION: Acute Flaccid Paralysis (AFP) is a group of diverse clinical condition of varied etiology characterized by acute onset of paralysis where the affected limb or limbs are flaccid or floppy.¹ World Health Organization (WHO) has defined AFP as any case of acute (rapid progress) flaccid (floppy) paralysis including Guillain-Barre syndrome in a person under fifteen years of age or any flaccid paralysis illness in a person of any age in which polio is suspected.^{1,2} Surveillance for AFP is one of the main strategies and the driving tool for polio eradication activities. The background rate of AFP among children is defined as the occurrence of at least one case of AFP per 100,000 children of less than 15 years of age per annum. The non-polio causes of AFP such as Guillain Barre Syndrome (GBS), Transverse Myelitis and traumatic neuritis are mainly responsible for this background rate regardless of whether acute polio exists in the community.¹ Although the most frightening condition leading to AFP is poliomyelitis which have been the leading cause of AFP till mid eighties³, it is caused by a number of non-polio conditions as well. Other viruses that may lead to AFP include mumps virus, most of the Coxsackie B1 and

Echoviruses^{1,4} Enteroviruses especially type 70 and 711,⁵ and acute West Nile virus⁶ the last three being considered important causes of childhood AFP associated with poliomyelitis like clinical and laboratory picture.^{1,6} It has also been reported with Dumb or paralytic rabies, post exposure anti rabies vaccination.⁷ In addition some toxins, metabolic defects, pharmacological products, tick bites, tumors and even serum sickness have been associated with AFP.⁸ Occasionally it is confused with pseudoparalysis caused by acute osteomyelitis, vitamin C deficiency, meningitis or meningoencephalitis etc.^{1,9} AFP is seen more frequently in the tropics than in temperate regions.¹⁰ A better understanding of the incidence and clinical expression of AFP in children less than 15 years old has been considered important enough to be set as one of the two targets by the Brazilian national program of immunization against poliomyelitis.³ Diagnosis of non polio cases of AFP can be difficult particularly for primary care health worker in peripheral health services. It is important to differentiate between polio and the non-polio causes of AFP since poliomyelitis is near eradication thus making it important to know its prevalence and etiology. The identification of these causes will help plan the methods for the timely diagnosis of the treatable causes and ensure the delivery of better and prompt management of the patients with AFP. It will also provide food for the researchers to devise newer investigations, treatments and/ or vaccines for the management of these debilitating conditions. With this objective in our mind we decided to determine the frequency of the causes of non-polio acute flaccid paralysis in the paediatric population of Sindh.

SUBJECTS AND METHODS:

Study design: descriptive /cross sectional survey.

Study duration: nine years from the year 2000 – 2009

Place of study: it is a community based study carried out in all the districts of the province of Sindh.

Sampling technique: stratified random sampling. Inclusion criteria: all cases of acute flaccid paralysis aged 0- <15 years, residents of Sindh who were picked up during the active AFP surveillance of the community as a part of polio eradication initiative. Data collection: this study was based on the data gathered from the province of Sindh during the surveillance carried out as an essential component of the national polio eradication program. AFP was diagnosed clinically through history and examination as per definition of the WHO as "Any

TABLE-I
CLASSIFICATION OF AFP CASES YEAR 2000-2009*
N=7891

Diagnosis	No.	%age
Total cases of AFP ¹ analyzed	7891	
Cases of Poliomyelitis	245	3.1%
Cases compatible with poliomyelitis	91	1.15 %
Cases discarded	7555	95.74 %

data record till sept 2009

1 – AFP- acute flaccid paralysis

TABLE2
CAUSES OF NON-POLIO AFP N=7555

Diagnosis	No.	%age
Guillain Barre syndrome	1594	21.09
Hemiplegia/ CVA ¹	1571	20.79
Encephalitis/Meningitis	534	7.06
Injection/Traumatic Neuritis	494	6.5
Hypokalemia	392	5.18
Non-polio EV ²	213	2.8
Transverse Myelitis	116	1.5
Unknown	005	0.06
Others	2700	35.73

1 CVA- cerebrovascular accident

2 EV- entero viruses

child <15 years of age with acute (rapid progression), flaccid paralysis, including (G.B.S) Guillain Barre Syndrome or any flaccid paralysis illness at any age when polio is suspected".² The diagnosis of the underlying cause of the AFP was based mostly on clinical grounds except for the cases reviewed by the provincial Expert Review Committee (PERC) where detailed analysis of the cases was done. Stool examination for viral isolation was done in all cases at the WHO accredited regional polio reference laboratory at the National Institute of Health (NIH) laboratory. While appropriate laboratory tests including serum electrolytes, cerebrospinal fluid (CSF) examination electrophysiological and

radiological studies were done in most cases where required. Therefore the strength of the result is based on the number of observations typical of epidemiological surveys and not in the accuracy of individual data. Cases with no viral isolation with inadequate stool specimen, no viral isolation with adequate stool specimen along with persistent polio like paralysis and cases with vaccine strains isolated from the stool were reviewed by the PERC for final diagnosis. The final diagnosis was based, as per recommendation of WHO, on the available clinical data, vaccination history, epidemiologic data for the province/district and laboratory results including serum electrolytes, CSF analysis, stool culture, electromyography (EMG), nerve conduction

TABLE-III
“OTHER” CAUSES OF NON-POLIO AFP N= 1982

Diseases	Total years 2000- 2009		Years 2000- 2003		Years 2004- 2009	
	N=1982		N=366		N=1616	
	No.	%age	No.	%age	No.	%age
Related to PNS ¹	447	22.5	241	65.84	206	12.74
Related to joints	419	21.14	14	3.82	405	25.00
Related to CNS ²	349	17.62	44	12.02	305	18.85
Related to bones	290	14.62	16	4.37	274	16.95
Muscle and soft tissues	236	11.90	04	1.09	232	14.35
PCM ³ & Electrolyte imbalance	106	5.34	15	4.09	91	5.63
Miscellaneous	122	6.15	19	5.19	103	6.37

1 PNS- peripheral nervous system

2 CNS-central nervous system

3 PCM- protein calorie malnutrition

velocity (NCV), CAT-scan / magnetic resonance imaging (MRI)/ magnetic resonance angiography (MRA) etc. Data was analyzed using EPI Info V2 of windows. Results were described in frequencies / percentages.

RESULTS:

A total of 7891 cases of AFP were reported over a period of nine years from March 2000 to Oct. 2009. 245 (3.1%) patients out of these were confirmed to be having poliomyelitis thus leaving 7646 cases with non-polio AFP. 91(1.19%) cases were found compatible with the diagnosis of poliomyelitis while the remaining 7555 cases were analyzed for the causes of non-polio AFP (Table-I). The most common cause of non-polio AFP identified in this series was GBS (21%) closely followed by hemiplegias and encephalitis / meningitis present in 20.7%, 7.06% of cases respectively (Table-II). A large group contributing 35.7% of cases consisted of miscellaneous causes not coded by the WHO for line listing. Unfortunately we could not acquire the full data of these “other causes”. The analysis of the available data of 1982 out of 2700 other causes of non-polio AFP revealed that the group of problems related to the peripheral nervous system (PNS) topped the list followed by joints related and central nervous system (CNS) disorders (Table-III). The comparison

TABLE-IV
AGE DISTRIBUTION OF AFP CASES
N=7646

Age group	No.	%age
0 - < 5years	5432	71.04
5 - <12years	1969	25.75
= 12 years	245	3.2

of the other causes of non-polio AFP before and after the introduction of the liberal policy for AFP surveillance showed the increased reporting of false or pseudoparalysis specially related to the joints and bones rather than the true acute flaccid paralysis as was the case before the implementation of the liberal policy. The age group affected most by AFP belonged to 0 - < 5 years (71%) with 2-< 5years being the group affected most (Table-IV).

DISCUSSION:

With poliomyelitis nearing its elimination in the world the other causes of acute flaccid paralysis (AFP) in children and adults has gained significance.¹¹ The introduction and implementation of the AFP surveillance system has resulted in improvement in the diagnosis of AFP cases, particularly Guillain Barré syndrome (GBS).¹² Various data analysis of AFP cases over the last two decades has consistently reported GBS as the most common cause of non-polio AFP

all over the world^{13,14,15} with a frequency ranging from 32% in Islamabad¹⁶ to 70% in central America.¹⁷ Mostly the frequency lies between 32%¹⁶-47%¹⁴. although the results of our study conform to the rest of the national and international literature in having GBS as the most frequent cause of non-polio AFP, the frequency surprisingly stands much lower at 21% which is even lower than the reported figures of 32% from Islamabad¹⁶ and 47% from Hazara.⁹ Though the frequencies of meningitis/ encephalitis, injection/ traumatic neuritis and transverse myelitis are mostly compatible with the results of some other studies reported from within^{9,16} and outside the country^{3,12,18} major discrepancies were noted in the frequencies of hemiplegias/ stroke/ cerebral vascular accidents (CVA) and non-polio enterovirus (EV) isolation. While in our series hemiplegias were responsible for almost as much cases as GBS amounting to almost 21% of non-polio AFPs, Hazara reported it in 6.75% and Islamabad in 14% of their studies.⁹

¹⁶ Perhaps the very large sample size of our study as compared to all the other studies may be contributory to this discrepancy of results of GBS and hemiplegias. Also with the introduction of the liberal policy for AFP surveillance¹⁴ 2004 the number of cases misdiagnosed as AFP have increased significantly thus creating a false decrease in the percentage of GBS as a cause of non-polio AFP. Similarly the improvement in the surveillance system with possibly increased awareness of the medical personnel regarding the notification of AFP cases has resulted in increased reporting of hemiplegias as AFP. The variations in the frequencies of non-polio enteroviruses is also compatible with the international literature as various states of America have reported the frequency of EV as a cause of AFP in range of <5% -60-80%¹⁹ while Indian literature reports it in the range of 20- 54%.^{20,21} This variation may be accounted for by a number of enteroviruses grouped as non-polio EV which can circulate simultaneously throughout a community or region having different and overlapping epidemiological characteristics thus affecting their prevalence in different geographical areas. The largest group accounting for about 36% of the cases comprised of "other " or miscellaneous causes of non-polio AFP which were not coded by WHO for line listing and mostly misdiagnosed as poliomyelitis or AFP. This too is comparable to three large international studies one each from Brazil (32%), 3 Latin America (33%) 12 and Pan America (32%).²² We tried to analyze these other causes of non-polio AFP. Unfortunately we could not acquire the complete data of the nine studied years. However the available record of 1982 out of 2700 other causes showed the disorders related to the peripheral nervous system (PNS) to be the most common group followed very closely by joints and central nervous system (CNS). (The detailed breakdown of the other causes is beyond the scope of this article). Together bones and joints related problems were the commonest group among the other causes of non-polio AFP. The interesting fact that emerged through this analysis of the other causes of non-polio AFP is the increase in the frequency of pseudoparalysis reports as compared to the true AFP after the introduction and implementation of the liberal policy for AFP surveillance in year 2004. It can be appreciated from the records that before the introduction of the liberal policy the commonest group of other causes of non-polio AFP was related to the PNS amounting to 66% which are actually and technically true flaccid paralysis while after 2004 the

commonest group was related to bones and joints (42%) resulting in pseudoparalysis while PNS was responsible for only about 13% of cases. The liberal policy therefore has resulted in increased reporting of the false cases thus diluting the actual frequency of the common causes of true AFPs. Nevertheless this has also resulted in improved diagnosis of otherwise falsely missed cases of poliomyelitis (Rec file PEI /EPI Sindh. Dated 10/10/2009) which is the basic objective of the AFP surveillance system. The age group affected most by AFP is 0-<5 years accounting for 71% of cases. Other studies also report less than five years as the most commonly affected age group. 9, 13, 18 Mean age of 4.5 years is reported from other authors, 11, 23 which is in accordance with our results.

CONCLUSION:

The study confirms GBS as the most common cause of AFP in the paediatric population of Sindh. The reporting of cases with pseudoparalysis is quite high. It further emphasizes the importance of the AFP surveillance and identification of various causes of AFP in children for their better management.

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