ORIGINAL ARTICLE

Profile of Cerebral Palsy in Dr. Soetomo General Hospital Surabaya, Indonesia

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ABSTRACT

Introduction: Limited profile data of Cerebral Palsy (CP) patients in Indonesia leads CP to be a less-known disease. The aim of this study is to describe CP patient's characteristics, including demographic aspect, gestation and birth history, and CP related condition in Dr. Soetomo General Hospital Surabaya, Indonesia.
Methods: Cross-sectional study using medical records of CP patients in Dr. Soetomo General Hospital (Surabaya, Indonesia) Outpatient Installation for Pediatric Neurology from January 2016 to June 2018. Data processed descriptively.
Results: From total 107 patients, 50 subjects met inclusion criteria. Mean age was 6.16 years old, with domination of male (3:2), live in Surabaya (56%), malnourished (24%), normal birth weight (80.9%), term age of birth (66.7%), spontaneous labor (60%), and also prenatal events as causes of Cerebral Palsy (69.5%). Pneumonia was found to be most among postnatal events leading to Cerebral Palsy (30%). Most of the type was spastic (9:1) with quadriplegic as the dominating one (64%). Congenital malformation was rarely found (38%), but co-morbidities were found in almost all sample (92%).
Conclusion: Gestation and birth history of CP patients are mostly ranged normal. Prenatal etiology is found dominating as the cause of CP, therefore emendation in antenatal care (ANC) shall be considered. Analytical study about CP in Indonesia also must be improved because it is still hardly found.

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Introduction

Every year, a prevalence of 1.5 to 4 every 1000 live-born babies suffer from Cerebral Palsy.[1] In Indonesia, the prevalence was predicted to be 1 to 5 every 1000 live-born.[2]

The term Cerebral Palsy (CP) refers to a neurological condition affecting muscle coordination and gait thus the sufferer have difficulties to maintain balance and gait. These conditions happened because the brain is abnormal, results from disturbance to brain development along the prenatal, natal, and postnatal period. Despite that, in CP the brain's state is not getting worse over time.[3]

There are many classifications regarding Cerebral Palsy. According to Minear and the Nomenclature and Classification Committee of the American Academy for Cerebral Palsy[4], Cerebral Palsy is classified based on physiologic, topographic, etiologic, neuropathologic, comorbidities, seriousness, and therapy. Physiologically, Cerebral Palsy is divided into pyramidal type and extrapyramidal type. Pyramidal type or spastic type is the most common type, whilst extrapyramidal type (in this study will be called as non spastic) is divided into dyskinesia and ataxia.[5]

Topographically, Cerebral Palsy is divided following the limb affected. It could be one limb (monoplegia), two limbs (diplegia, hemiplegia, and paraplegia), three limbs (triplegia), or four limbs (quadriplegia, and double hemiplegia).[4] This topographic classification might be differs throughout time and places, either the terminology only, or even the meaning.

Etiology of CP is easier to understand if grouped based on time when disturbance probably took place, which are prenatal, natal, and postnatal.[4] CP resulting from brain disturbance during prenatal and natal period, may present better condition than the one occurred postnatal.[6] Though definite cause is remain unclear, some risk factors had been proposed as the etiology of CP, including infection, teratogen exposure, hereditary, haemorrhage, seizure, asphyxia, maternal condition, and etc.[4, 7]

Epidemiologically, male sex, Caucasians, premature, and low birth weight have bigger risk from suffering CP,[4,7] Domination of male sex have been observed since many years ago despite any condition that might interfere, such

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as prematurity.[8] A previous study found that Asian 13% to 38% less likely to develop CP than non-Hispanic white.[9] Premature birth, especially under 28 weeks of gestation, is the leading risk factor prior to CP.[10] Babies born with low birth weight, under 1000 grams, about 45 to 90 times at risk than those born with normal birth weight, more than 2500 grams.[11]

The aim of this study is to describe CP patient's characteristic, including demographic aspect, gestation and birth history, and CP related condition in Dr. Soetomo General Hospital Surabaya, Indonesia.

Methods

This cross-sectional designed study using medical records from January 2016 to June 2018 in Outpatient Installation for Pediatric Neurology at Dr. Soetomo General Hospital. Sampling technique of this study was total sampling. The inclusion criterias were those diagnosed with Cerebral Palsy in assessment part on medical record at least 1 time, over the period given, by the doctor on duty. Data were excluded if remained absent by the time of data collecting in March, April, and August 2018 or having no information of sex and physiological type of Cerebral Palsy. Variables of this study were age, sex, origin city, nutritional state, birth weight, gestational age, labor process, etiology of Cerebral Palsy, type of Cerebral Palsy (physiologically and topographically), congenital malformation, and comorbidities. Etiology of CP was determined by the presence of any risk factor during each period, which were prenatal, natal, and postnatal. Nutritional state was measured by anthropometry score only for age less than 60 months, by weight to age tool.[12] Data were categorized into malnourished (<-3SD), poor nutritional state (-3SD to -2SD), and good nutritional state (-2SD to 2SD). All data were processed using Microsoft Excel 2010.

Results

Out of 107 data, only 50 data met the criterion set (8 were absent, 16 were not diagnosed with CP, and 33 had the exclusion criterion). Except for sex dan CP type, sample used were incomplete, thus for each variable might differ in the sum of the sample. Results of this study presented in groups: demographic findings, gestation and birth history, and CP related condition.

Demographic Findings

As shown in table 1, on June 2018, age known from CP patients varied from 1-14 years old (n=49), average age was 6.16 years old. Sex and origin city dominated by male (3:2) and those coming from similar city, Surabaya.

Table 1. Demographic findings

Variables	Domination	N (%)
Age [49]	4-6 y.o.	15 (30.6)
Sex [50]	Male	30 (60)
Origin city [50]	Surabaya	28 (56)

*[ ]: n

Gestation and Birth History

Most of CP patients had normal weight at birth, around 2500 – 3900 g (80.9%), as shown in table 2. The rest were born with low birth weight (<2500 g) and none were born over weight (>3900 g). None of the sample were born post term. Among the labor process, those were born through vagina, either spontaneous or device-assisted, higher than caesarean section. Twelve were born spontaneously, thus made this labor process as the one dominating. About the data, 29 were remains unknown for each birth weight and gestational age, and 30 were unknown for labor process.

Table 2. Gestation and Biorth History

Variables	Domination	N (%)
Birth Weight [21]	2500-3900 g	17 (80,9)
Gestational Age [21]	Term	14 (66.7)
Labor Process [20]	Spontaneous	12 (60)

*[ ]: n

CP Related Condition

As shown in table 3, data found (n=25) are ranged from <-3SD to 1SD. Those categorized as malnourished and poor nutritional state had bigger number than those with good nutritional state.

Almost all CP patients occupied this disability as a result of disturbance during prenatal period. Though the number is lesser, CP occurred because of postnatal events still have a big number. Postnatal events cause this condition the most were pneumonia, then meningoencephalitis and acute respiratory infection (Table 4). Fourteen data were unable to identify the cause of CP.

Physiologically, spastic type occurred way more than non spastic type (9:1). From the spastic type then categorized topographically. Other than 12 data were unknown (n=33), quadriplegia is the dominating one.

Table 3. CP related condition

Variables		N (%)
Nutritional State [25]	Malnourished	6 (24)
	Poor-nourished	9 (36)
	Well-nourished	10 (40)
CP cause [36]	Prenatal	25 (69.5)
	Natal	12 (33.4)
	Postnatal	20 (55.7)
Physiological type of CP [50]	Spastic	45 (90)
Topographical type of CP [45]	Quadriplegia	21 (64)
Congenital Malformation [50]	None	31 (62)
Comorbidity [50]	Present	46 (92)

*[ ]: n

Table 4. Found most postnatal events as cause of CP

Cause	N (%)
Pneumonia	6 (30)
Meningoencephalitis	5 (25)
Acute Respiratory Tract Infection	4 (20)

Congenital malformation are uncommon in CP patients, yet most of them suffer comorbidities together with CP. Microcephaly was the majority among defined congenital malformations occupied by CP patients in this study, then hydrocephalus, and ASD type II (Table 5). The most frequently found comorbidity in this study was epilepsy. Between those with epilepsy (n=25) and those without (n=25), female with epilepsy were more than female without (Table 6).

Table 5. Congenital malformations found most in CP patients

Congenital malformation	N (%)
Microcephaly	9 (18)
Hydrocephalus	5 (10)
ASD type II	4 (8)

Table 6. Epilepsy sex distribution as comorbidity found most

	Epilepsy [N (%)]	
	(+)	(-)
Male	14 (28)	16 (32)
Female	11 (22)	9 (18)
Total [N (%)]	25 (50)	25 (50)

Discussion

Age of CP patients in this study and previous one came out different becausethe age range needed by the researcher were not same.[13] Regarding male sex, this domination was also found in study conducted before.[14] Different foetal neurobiological development had been suggested as a reason explaining this situation.[15] This was statistically proven, but the pathophysiology is still under-research. Patient admission and visitation to Dr. Soetomo General Hospital were those coming from similar city and out of the city, including the Outpatient Installation. This happened because the hospital is national preference.[16]

Similar result of normal birth weight domination was found on a study done in India.[17] Theoretically, number of CP will decrease as the birth weight increase[11], but this condition might not be applied in studies conducted in developing countries like Indonesia and India. Term age of birth, and spontaneous labor also found the most in previous study.[17,18] Birth asphyxia once had been suggested as a reason why CP occurred in term infants, but updated study found various things contributing.[19] Meanwhile for spontaneous labor, baby might get exposed with more site of infection when through the birth passage, which also provide a natal risk factor of CP.

A majority of malnourished and poor nutritional state CP patients were similar to study conducted before using WHO growth curve.[20] Another study explained this situation as a disturbance in growth hormone (GH) release.[21] A severe brain damage in CP patient may cause this disruption in normal GH secretion[22] and may affects growth and development of CP patient in various way.

Cerebral Palsy caused by disturbance during prenatal period also stated in a previous study.[23] In Indonesia, Antenatal Care (ANC) is a national programme arranged to prevent many health issues of mother and her baby. The effectiveness of this programme should be questioned regarding prenatal event as the most cause of CP in this study. As stated before, number of CP predisposed by postnatal events, is less than prenatal events. However, Post-neonatal Cerebral Palsy (PNCP), CP caused by postnatal events, as a previous study stated before, statistically presented more fatal condition.[6] The reason behind it, is still minimally understood. Pneumonia as the one dominating cause was also found in a study done before.[24]

Cerebral Palsy type domination was similar to the global data, which is spastic type.[25] As for topographical distribution, the result was similar with a study conducted before, which is quadriplegia.[26] Only small number of CP patients have any congenital malformation. Global data showed only 5% of CP patient have congenital malformation.[27] Among the small amount, microcephaly was found as one most occurred in CP patients, like a study done before.[19] Association between CP and occurrence of microcephaly is still questionable. Unlike congenital malformation, almost every CP patients suffer from comorbidity. The most common comorbidity found in this study was epilepsy. This result consistent with a study done before.[28] Extensive brain injury in CP patient affecting cortex, deep white matter, and central nuclei provide a reason for them to develop epilepsy. A study in China stated that epilepsy incidence is influenced by geographic position and socio-economic condition[29] that can relate with Indonesia condition, especially Surabaya. Among those with epilepsy, statistically, female has bigger risk developing epilepsy.[30]

Many aspects still out of discussion from this study, like ANC history. This aspect is important to know if CP condition may come from maternal unpreparedness, regarding the domination of prenatal cause of CP from this study. Data about CP patients in Indonesia is still minimal, thus many references coming from other country may have different sociodemographic background.

Conclusion

Gestation and birth history of CP patients in Dr. Soetomo General Hospital were mostly ranged normal. Spastic CP is the most common type and epilepsy present as the most common comorbidity. Sample used for other study with the same objective should be more strictly chosen so that the result could be more precise. Analytical study about CP in Indonesia also must be improved because it is still limited.

Conflict of Interest

The author stated there is no conflict of interest

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