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Yes, We Can Prevent Peripartum Cardiomyopathy, but…

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ABSTRACT

Definition: Peripartum cardiomyopathy is the onset of heart failure with no identifiable cause within the last month of pregnancy or within 5 months after delivery.

Aims: To understand the unequal incidence of this peripartum cardiomyopathy in the world, to identify populations at risk and their way of life, to propose prevention.

Methods: Systematic analysis of medical publications reporting clinical cases of peripartum cardiomyopathy in the World.

Results: From 1939 to 2018, 1343 published cases were identified in North-America, Haiti, Africa, Middle East, India, China, Vietnam, Corea, Japan. Among them, 967 cases (72%) are Black, African or African American women. In Black Africa and in Haiti, 100% of patients are black. In Europe, peripartum cardiomyopathy is rare in the Caucasian population; no observation is reported in Black, although a black minority lives there, especially in France. In North America, out of Haiti, 47 % (155/327) patients are black, while the black population minority accounts for only 15 % of total population in the USA. In Middle and Far East, publications are rare given the demographic importance of these countries. Most of the time, the authors report a poor socio-economic status of their patients.

Conclusion: Peripartum cardiomyopathy is a frequent condition among black population in Haiti and Africa. In North-America and in Europe, peripartum cardiomyopathy is a rare condition. The black population of the USA is more exposed to this disease than the Caucasian populations. A strong link between peripartum cardiomyopathy and poverty exists. Preventing peripartum cardiomyopathy is possible but comes up against the living conditions of the populations.

INTRODUCTION

Peripartum Cardiomyopathy (PPCM) is the onset of heart failure with no identifiable cause within the last month of pregnancy or within 5 months after delivery [1]. It is common in some countries and rare in others. The causes and pathogenesis are poorly understood [2]. Our observations on the ground [3], during 25 years, in France and in Republics of Benin, Niger and Mali (West Africa) inspired us this poetic aphorism:

Peri partum cardiomyopathy - Poor of poor country
Peripartum cardiomyopathy strikes
Often poor women from poor regions
Sometimes poor women from rich countries
Rarely wealthy women from poor countries
Never wealthy women from rich countries.

Indeed, we notice a strong link between this disease and poverty, particularly the poverty observed daily in developing countries. We define the concept of poverty of poor countries: association of lack of financial resources with lack of schooling (illiteracy), food insecurity, poor hygiene and weakness of care structures. The aim of this work is to demonstrate, through the analysis of the medical literature, the relationship between Poverty and Peripartum Cardiomyopathy (PPCM) in the World.

PATIENTS AND METHODS

The identification of relevant references in the medical literature was based on the following key words: postpartum cardiomyopathy, postpartum heart failure, postpartum cardiac failure, heart failure in the puerperium, heart failure and pregnancy. The PubMed database was used as well as francophone journals, notably the journal Cardiologie tropicale. Articles selected are those that deal with original clinical data. The geographical location of each publication was taken into account to identify the geographical origin of the patients. Critical review of publications has eliminated clinical descriptions that are inconsistent with the current definition of PPCM. In each publication, we searched if patients were mentioned Black or not. In the absence of indication, we concluded that patients were not Black except those living in Black Africa. Several publications report previously published cases of PPCM. When we were able to identify this situation, we included in our calculations all the cases of the most recent publication.

RESULTS

The table 1 summarizes results of North America and Haiti, the II results of Africa, the III results of Europe and IV results of Middle and Far East, obtained by analysis of the world medical literature. The total number of published PPCM cases is 427 + 716 + 60 + 140 = 1343. The number of Black patients is largely predominant 255 + 712 = 967/1343 (72%). In North America (Table 1) most publications relate 1 or a few cases PPCM, except for Burch et al. [19] in Louisiana, (32/34 were Black patients), Pierce et al., [4] in Arkansas (16/17 were Black), Demakis and al., [15] in Illinois (25/27 Black), Walsh et al., [18] Louisiana (15/15 Black), Witlin et al., [25] Tennessee (21/28 Black), Cunningham et al., [26] Texas (8/14 Black). Two papers are particular. Elkayam et al. [9] reported 100 cases in California, in a multicenter study. Nineteen patients were Black but the geographical origin of these patients is not specified. In North America, out of Haiti, 47 % (155/327) patients are black, while the black population minority accounts for only 15 % of total population in the USA [29]. Fett et al. [13] reported 100 cases in Haiti where the population is Black. In Africa (Table 2), except in Tunisia, all patients are Blacks. Several authors report large groups of patients with PPCM: 227 in North Nigeria (Zaria) (46), 71 in Burkina Faso (Bobo-Dioulasso) (33), 66 in the Republic of Niger (Niamey) (42).

In Europe, the large majority of publications relate 1 to 3 cases, except Barillon (9 cases) (63) and Ferriere, a multicenter study (11 cases) [66]. There is no Black patient in this European group.

In Middle and Far East, 4 publications report more than 10 patients: 48 in North India (Chandigarh) [81], 20 in North India (New Delhi) [82], 15 (all poor) in South East India (Calcutta) [79] and 15 in North Vietnam (Hanoi) [89]. A special report is the group of 21 PPCM patients reported by Blegen et al. (Corea) [78]. These patients also had symptoms of beriberi. Blegen wrote “A positive history of long-standing malnutrition because of extreme poverty were found in all but one of the 21 cases. In this case where the economy was not so bad, the patient had suffered from marked anorexia throughout the pregnancy and had therefore subsisted on a very insufficient diet”. The mean value of reported number of PPCM is 18 in North America, 34 in Africa, 2 in Europe, 10 in Middle and Far East.

DISCUSSION

In the medical literature, the PPCM is described in many countries, on at least 4 continents: North America, Africa, Europe and Asia. Meadows [14], one of the first, describe with precision this disease in Illinois (Chicago) about 4 Black patients and proposed the designation: “Idiopathic myocardial failure in the last trimester of pregnancy and the puerperium”. Later, with the development of echography, the authors will choose “peripartum cardiomyopathy” or PPCM. In cardiac echography this is a dilated cardiomyopathy. Several Reviews are available [2,90-92].

There is no information, in the analysis of North America publications, about the socio-economic status of patients with PPCM. But the historical context of the 1950s-1980s suggests

that these Black patients with PPCM belonged more to the poor social classes.

In this survey, the differences in frequency are very important according to the regions of the world. In Europe, the PPCM is very rare and none patient is Black, while many Black women live in Europe, especially in France, often native from West Africa [93].

In Africa, PPCM is a frequent condition. In the North Nigeria (Zaria), several hundred cases were described in a population of Black women (Hausa ethnic group) [46]. In a rural area of this country (Kaduna), the PPCM condition is a frequent cause of hospitalization [45]. A study, in Western Niger [94], defined the clinical prevalence of postpartum cardiac failure (1.4 per 1,000 females of child-bearing age) in a sudanese sahelian population living in a rural area. Two hospital studies, one realized in Niamey (Niger, sahelian area) [42], the other in Bamako (Mali, Sudanese area) [41] pointed out the high incidence of PPCM in West Africa: 66 cases in 4 years in Niamey, 28 cases in 2 years in Bamako. When symptoms of PPCM appeared, a large majority of these patients were living in rural area. Then, Black african women living in rural area are a population at high risk of PPCM. In South Nigeria (Lagos, 14 cases in 5 years) [44] and in South Benin (Cotonou, 10 cases in 2 years) [31], PPCM is less frequent than in North, but the population is more urbanized, different from those in the North. In addition, the climate is sub-equatorial, more favorable to agriculture and food production. In Middle and Far East, the PPCM is also present, but with an heterogeneous distribution.

In India, the authors reported 2/3 (63 %) of PPCM [79-82]. In the report of 48 cases by Khattri et al. [81], in North India, the authors do not precise the geographic origin of patients but write: "Most (44%) of the patients were of average build, 37 % were thin and undernourished and 16 % were obese". In the report of 15 cases of Ghosh et al. [79], "all patients are poor" is mentioned. In Saudi Arabia, Perrine [88] reported 7 cases in an Arab population. He wrote about the patients and their husbands: "The patients received either no prenatal care, or almost none, even though such care is free, as is admission to hospital for delivery. Their husbands were in the lower range of salary levels within the company. These facts strongly suggest that these patients belong to a relatively low socio-economic level." Many risk factors of PPCM are known, abundantly cited in the medical literature [95]: non Caucasian ethnicity, heat, advanced maternal age, multiparity, multiple pregnancy, prolonged tocolytic use, poor socio-economic status. This late risk, although cited, was not studied and the majority of the authors neglected it. The lack of information on the socio-economic context of patients in most publications provides evidence. However the daily life of Black women in Africa, in rural areas, is known. The hard physical works are daily: water supply and firewood, long marches with heavy loads, pounding millet (a millet pestle weighs 15 kg).

During pregnancy the daily work is the same until childbirth. After childbirth, the bed rest and the breastfeeding are the custom with special habits: in Zaria (Hausa women) [46], the given birth is stretched on a hot bed in a hut. The bed is made of clay and the fire is kindled beneath it. Furthermore, the breastfeeding mother adds to her food a large amount of "kanwa", a natural product rich in sodium. In Niamey (Zarma-Songhai women) [42], the given birth applies a quarantine with daily hot water ablutions and adds "sosso" (= "kanwa") in her food [3]. First PPCM symptoms appear 2/3 (67 %) during this quarantine. All these patients are poor [42].

Thus, whenever information on socio-economic status is given in publications, it is poverty. A contrary information is never indicated. One could add that poverty goes hand in hand with a difficult life, food insecurity, rough physical work, daily stress. Rest counseling during pregnancy is not relevant in this group. In black Africa, in rural areas, all these conditions are in addition to the maternal haemodynamic changes in pregnancy: the reason why PPCM is more frequent in this population is that it very often combines all the risk factors, including those related to specific postpartum habits (ablutions with hot water, kanwa). In Europe, particularly in France, the Labor Code (*Code du travail*) provides for maternity leave 6 weeks before delivery, 10 weeks after delivery [96]. These dates cover the period when the PPCM symptoms occur. Burch et al. [19] wrote in 1971, about 34 cases (Louisiana), including 32 Black patients with PPCM, in the Summary: "The importance of the early institution of therapy, especially complete bed rest, in altering the otherwise poor natural course of the disease is emphasized". It is very likely for these reasons that PPCM is rare in Europe despite a large black minority. This black population, whose way of life is different from that of black

Africa, is protected from the PPCM.

Table 1:North America – Haiti

Country	Author (first)	Year	Reference	Cases (n)	Black (n)
Arkansas	Pierce	1963	4	17	16
Canada	MacKinnon	1949	5	1	0
Canada	Pearce	1999	6	1	?
California	Schmidt	1989	7	4	2
California	Rizek	1994	8	34	?
California	Elkayam	2005	9	100	19
Colorado	Leonard	1992	10	1	0
Florida	Marcus	1955	11	1	0
Georgia	Wilmer	1963	12	9	7
Haiti	Fett	2004	13	100	100
Illinois	Meadows*	1957	14		
Illinois	Demakis	1971	15	27	25
Illinois	O'Connel	1986	16	14	?
Louisiana	Musser	1939	17	3	1
Louisiana	Walsh	1965	18	15	15
Louisiana	Burch	1971	19	34	32
Maryland	Weitz	1983	20	3	3
Massachusetts	Cole	1987	21	14	1
Mississipi	Beebe	1988	22	1	1
New York	Becker	1962	23	2	1
Pennsylvania	Cepin	1983	24	1	1
Tennessee	Witlin	1997	25	28	21
Texas	Cunningham	1986	26	14	8
Washington	Johnson	1966	27	1	1
Washington	Adler	1986	28	2	1
Total				427	255
Mean				18	

*Meadows reported 4 cases in 1957 but these cases were included in the publication of Demakis in 1971.

Table 2: Africa

Country	Author (first)	Year	Reference	Cases (n)	Black (n)
South Africa	Seftel	1961	30	23	23
Benin	Cénac	2009	31	10	10
Burkina Faso	Niakara	2000	32	32	32
Burkina Faso	Zabsonre	2000	33	71	71
Burkina Faso	Yameogo	2018	34	29	29
Cameroun	Mboulley Kotto	1999	35	12	12
Congo	Nkoua	1991	36	24	24
Ivory Cost	Bertrand	1977	37	25	25
Djibouti	Bernard	2000	38	1	1
Gambia	Rolfe	1992	39	27	27
Kenya	Sanderson	1986	40	11	11
Mali	Cénac	2004	41	28	28
Niger	Cénac	1989	42	66	66
Nigeria	Sanderson	1979	43	43	43
Nigeria	Talabi	1985	44	14	14
Nigeria	Boomsma	1989	45	17	17
Nigeria	Ford	1998	46	227	227
Nigeria	Danbauchi	2002	47	21	21
Senegal	Payet	1961	48	12	12
Senegal	Diao	2004	49	19	19
Tunisia	Ben Letaïfa	1999	50	4	0
Total				716	712
Mean				34	

Table 3: Europe

Country	Author (first)	Year	Reference	Cases (n)	Black (n)
Germany	Tandler	1997	51	1	?
England	Rosen	1959	52	1	0
England	Brown	1967	53	3	0
England	Hughes	1970	54	1	0
England	Rand	1975	55	1	0
England	Grace	1987	56	1	0
England	Purcell	1995	57	1	0
Finland	Von Bonsdorf	1939	58	1	0
France	Michon	1959	59	2	0
France	Foucault	1972	60	1	0
France	Sacrez	1972	61	3	0
France	Pierquin	1973	62	2	0
France	Barrillon	1978	63	9	0
France	Daubert	1978	64	2	0
France	Delecour	1978	65	1	0
France	Ferrière	1990	66	11	0
France	Grison	1994	67	1	0
France	Tesniere	2000	68	1	0
Hungary	Hetey	1996	69	1	0
Italia	Alberti	1990	70	6	0
Portugal	Macieira--Coelho	1990	71	1	0
Portugal	Brito	1997	72	1	0
Portugal	Rached	1998	73	1	0
Sweden	Forssell	1994	74	3	0
Swiss	Muller	1968	75	1	0
Swiss	Rifat	1995	76	3	0
Total				60	0
Mean				2	

Table 4: Middle and Far East

Country	Author (first)	Year	Reference	Case (n)	Black (n)
China	Chang	1952	77	1	0
Corea	Blegen	1965	78	21*	0
India	Ghosh	1974	79	15	0
India	Talwalkar	1978	80	5	0
India	Khattri	1988	81	48	0
India	Ravikishore	1991	82	20	0
Israel	Knobel	1984	83	1	0
Japan	Sakakiraba	1970	84	1	0
Japan	Tomaru	1995	85	2	0
Japan	Yagoro	1999	86	3	0
Taiwan	Hsieh	2003	87	1	0
Saudi Arabia	Perrine	1967	88	7	0
Vietnam	Khai	1993	89	15	0
Total				140	0
Mean				10	

* associated with beri-beri epidemy

CONCLUSION

Yes, we can prevent peripartum cardiomyopathy, but such a challenge involves changing the way of life of millions of people and effectively fighting poverty.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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The dance around the world
If all around the world the girls would hold their hands
They could dance in a circle all around the sea.
If all around the world the boys could be sailors
They'd feast a pretty bridge on their boats on the sea.
Then all around the world we could dance
If all around the world people would hold their hands.
Paul Fort