Seroprevalence of Human Parvovirus B19 Antibodies among Sudanese Patients with Rheumatoid Arthritis

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ABSTRACT

Background: In order to find a relationship between the Parvovirus B19 and the extent of its relation with Rheumatoid Arthritis, it was decided to carry out this study with the objective to determine the seroprevalence of both IgM and IgG anti- Parvovirus B19 among Sudanese patients with Rheumatoid Arthritis.
Methods: it was cross sectional hospital based study. 90 blood samples were collected from known Sudanese patients who visited the rheumatology clinic of different hospitals in Khartoum – SUDAN and fulfilled the American College of Rheumatology Criteria for Rheumatoid Arthritis in the period between April and July 2014. The anti-citrullinated cyclic peptide (ACCP) and rheumatoid factor (RF) were done to all patients and ELISA technique was used for detection of IgG and IgM anti-parvovirus B19 in patients' serum.
Result: The results presented herein show the presence of IgM anti-parvovirus B19 in 31 (34.4%) of RA examined patients (27 (30%) female and 4 (4.4%) male). The IgG was detected in 49 (54.4%) of the study subjects (40 (44.4%) female and 9 (10%) male).
Conclusion: our study extends and agrees with the previous observations regarding a high prevalence of B19 antibodies in patients with RA, and a possible role of its infection in the pathogenesis of RA. We recommend the researchers to search in depth at molecular level about the possible relations between parvovirus B19 and RA in Sudanese patients.

Keywords- Parvovirus B19, Rheumatoid arthritis, Khartoum, Sudan.

INTRODUCTION

Rheumatoid Arthritis (RA) is an autoimmune disorder characterized by joint inflammation, it affect around 1% of the general population worldwide and occurs in all races and ethnic groups with predominance in women[1,2]. The disease generally is more frequent in older people and this does not mean the impossibility of its occurrence in children; when it in children it called juvenile RA[3]. The prevalence of RA in Northern European and North American areas estimated a prevalence of 0.5–1.1%. The reports from the countries of Southern European showed a prevalence of 0.3–0.7%. The lower prevalence noticed was from the developing countries (between 0.1% and 0.5%)[4]. To the best of our knowledge there are no scientific publications or declared official statistics to show the prevalence of RA in Sudan.

The etiology of RA is not fully understood[5]. Many factors suggested playing roles in the pathogenesis of RA including both genetic and environmental factors[6]. Several studies have demonstrated the role of viruses such as rubella, human parvovirus B19, cytomegalovirus (CMV), human T cell leukemia virus1, and HIV in causing an acute onset of polyarthritis[7-11]. It was stated that arthropathy associated with B19infection resembles the diagnostic criteria of rheumatoid arthritis (RA) or juvenile arthritis. Number of studies suggested that B19 can cause RA and destruction in joints, which could be followed by the development of rheumatoid factor (RF) and detection of B19 DNA in the tissues of the affected joints[12-15].

Our objective was to determine the seroprevalence of both IgM and IgG anti-parvovirus B19 among Sudanese patients with RA.

MATERIALS AND METHODS

Ninety Sudanese patients (77 females, 13males; age between 10 – >45 years) with rheumatic diseases who visited the rheumatology clinic of different Hospitals, Khartoum – Sudan, in the period between April and July 2014 were enrolled in this cross sectional study. A basic selection criteria includes the Sudanese patients who fulfilled the criteria of the American College of Rheumatology1987 (ACR) for RA. Non Sudanese patients with RA and the doubtful diagnosed patients were excluded. The demographic data, titers of RF and anti-CCP antibodies of each patient were recorded. Serum from each subject was tested for Anti-CCP and anti-parvovirus B19 (IgM and IgG) by ELISA technique (Euroimmun company–Germany), RF (IgM) was done by latex technique. Assays were performed as recommended by the manufacturer. Serum samples were collected and stored at −80°C until assayed. The study was approved by the Ethics committee of AlNeelain University.

Data was statistically analyzed by Statistical software packages (Excel 5.0, Microsoft, Redmond, WA); and Statistical Package for the Social Sciences 20.0, SPSS, Inc., Chicago, IL).

RESULTS

The results presented here in show the presence of IgM anti-parvovirus B19 in 31 (34.4%) of RA examined patients (27 (30%) female and 4 (4.4%) male). The IgG was detected in 49 (54.4%) of the study subjects (40 (44.4%) female and 9 (10%) male) (Table 1). The IgM and IgG was detected in 7 (7.8%) and 15 (16.7%) of patients on medications, respectively. All patients were anti-CCP and RF positive. A high rate of IgG antibodies was noticed in the age group between 25–45 years (Table 2). Based on patient's occupation the house wife was representing the peak percentage

of parvovirus B19 infection in this study (Table 3). The females show predominance in number, their percentage reach 77 (85.6%) of the total patients the female to male ratio was (5.9:1). The age group distribution of the patients was shown in figure 1.

DISCUSSION

To the best of our knowledge this study will be the first one in Sudan to determine the seroprevalence of IgM and IgG anti- parvovirus B19 among Sudanese patients with RA. Globally, several studies suggested the link between parvovirus B19 infection and the development of rheumatoid arthritis[7-12,13].

The presence of B19 in RA synovial cells was suggested to have a role in initiation and perpetuation of RA synovitis by Takahashi Y _et al_[14]. Meyer O demonstrated that acute B19 infection can simulate early RA[15]. Cohen _et al_ demonstrated the high prevalence of anti B19 among RA patients[16].

This study reports a considerable prevalence of anti- parvovirus B19 among Sudanese patients with RA. IgM anti- parvovirus B19 was detected in 34.4% while IgG was detected in 54.4% of the study subjects. In Turkey, R. Caliskan _et al_ also observed the high prevalence of both IgM and IgG anti- parvovirus in patients with RA[17]. In Switzerland, P Cassinotti _et al_ found that 75% of the patients suffering from RA with rheumatoid factor had anti B19 IgG antibodies[18]. Gonzalez _et al_ mentioned the presence of IgM against parvovirus B19 in 20% of the patients with juvenile idiopathic arthritis while IgG was found in 32%[19]. In general, the presence of the IgM indicates recent infection while the IgG indicates the previous and recurrent infection of parvovirus B19 in such patients. The dominance of females was noticed in the current study, the result is in accordance with the result obtained by Teh and Wong, 84.4% of the RA patients n tier study were female[20]. The finding was also supported by the findings of Lawrence _et al_ in which female RA patients were four times more common than male[21].

In conclusion, our study extends and agrees with the previous observations regarding a high prevalence of B19 antibodies in patients with RA, and a possible role of this viral infection in the pathogenesis of RA. We recommend the researchers to search in depth at molecular level about the possible relations between parvovirus B19 an RA in Sudanese patients.

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Conflict of interest

There was no conflict of interest.

REFERENCES

1. Gabriel, S. E. (2001). "The epidemiology of rheumatoid arthritis." _Rheumatic Disease Clinics of North America_ 27(2): 269-281.
2. Minnock, P., O. FitzGerald and B. Bresnihan (2003). "Women with established rheumatoid arthritis perceive pain as the predominant impairment of health status." _Rheumatology_ 42(8): 995-1000.
3. Avcin, T., R. Cimaz, F. Falcini, F. Zulian, G. Martini, G. Simonini, V. Porenta-Besic, G. Cecchini, M. O. Borghi and P. L. Meroni (2002). "Prevalence and clinical significance of anti-cyclic citrullinated peptide antibodies in juvenile idiopathic arthritis." _Ann Rheum Dis_ 61(7): 608-611.

4. Alamanos, Y. and A. A. Drosos (2005). "Epidemiology of adult rheumatoid arthritis." *Autoimmunity reviews* 4(3): 130-136.

5. Rindfleisch, J. A. and D. Muller (2005). "Diagnosis and management of rheumatoid arthritis." *Am Fam Physician* 72(6): 1037-1047.

6. Jawaheer, D., R. F. Lum, C. I. Amos, P. K. Gregersen and L. A. Criswell (2004). "Clustering of disease features within 512 multicase rheumatoid arthritis families." *Arthritis & Rheumatism* 50(3): 736-741.

7. White, D. G., Woolf, A. D., Mortimer, P. P., Cohen, B. J., Blake, D. R. & Bacon, P. A. (1985). Human parvovirus arthropathy. *Lancet i*, 419–421.

8. Reid, D. M., Reid, T. M. S., Brown, T., Rennie, J. A. N. & Eastmond, C. J. (1985) Human parvovirus- associated arthritis A clinical and laboratory description. *Lancet i*, 422–425.

9. Woolf, A. D., Campion, G. V., Chishic, K. A., Wise, S., Cohen, B. J., Klouda, P. T., Caul, O. & Dieppe, P. A. (1989).Clinical manifestations of human parvovirus B19 in adults. *Arch. Intern. Med*. 149, 1153–1156.

10. Nishioka, K., Maruyama, I., Sato, K., Kitajima, I., Nakajima, Y. & Osame, M. (1989). Chronic inflammatory arthropathy associated with HTLV-I. *Lancet 1*, 441.

11. Naides, S. J. (1994). Viral infection including HIV and AIDS. *Curr. Opin. Rheumatol*. 6, 423–428.

12. Dijkmans BAC, Van Elsacker-Niele AMW, Salimans MMM, v Van Albada-Kuipers GA, De Varies E, Weiland HT (1988) Human parvovirus B19 DNA in synovial fluid. *Arthritis Rheum* 31:279–281.

13. Tyndall A, Jelk W, Hirsch HH (1994) Parvovirus B19 and erosive polyarthritis. *Lancet* 343:480–481.

14. Takahashi Y, Murai C, Shibata S, et al. Human parvovirus B19 as a causative agent for rheumatoid arthritis. *Proc Natl Acad Sci USA* 1998; 95:8227–32.

15. Meyer O. Parvovirus B19 and autoimmune diseases. *Jt Bone Spine* 2003; 70:6–11.

16. Cohen, B. J., M. M. Buckley, J. P. Clewley, V. E. Jones, A. H. Puttick, and R. K. Jacoby. 1986. Human parvovirus infection in an early rheumatoid and inflammatory arthritis. *Ann. Rheum. Dis*. 45:832-838.

17. Caliskan R, Masatlioglu S, Aslan M, Altun S, Saribas S, Ergin S, Uckan E, Koksal V, Oz V, Altas K, Fresko I, Kocazeybek B. The relationship between arthritis and human parvovirus B19 infection. *Rheumatol Int*. 2005 Nov; 26(1):7-11.

18. P Cassinotti, S Bas, G Siegl, T L Vischer. Association between human parvovirus B 1 9infection and arthritis. *Annals of the Rheumatic Diseases* 1995; 54: 498-500.

19. Gonzalez B1, Larrañaga C, León O, Díaz P, Miranda M, Barría M, Gaggero A. Parvovirus B19 may have a role in the pathogenesis of juvenile idiopathic arthritis. *J Rheumatol*. 2007 Jun; 34(6):1336-40.

20. Teh, C. L. and J. S. Wong (2008). "The pattern and clinical manifestations of rheumatoid arthritis in Sarawak General Hospital." *Clin Rheumatol* 27(11): 1437-1440.

21. Lawrence, R. C., C. G. Helmick, F. C. Arnett, R. A. Deyo, D. T. Felson, E. H. Giannini, S. P. Heyse, R. Hirsch, M. C. Hochberg, G. G. Hunder, M. H. Liang, S. R. Pillemer, V. D. Steen and F. Wolfe (1998). "Estimates of the prevalence of arthritis and selected musculoskeletal disorders in the United States." *Arthritis Rheum* 41(5): 778-799.

Table 1. IgM and IgG anti-parvovirus B19 among RA patients in this study

Gender	RF		Anti-CCP		IgM anti-parvovirus B19		IgG anti-parvovirus B19	
	+ve	-ve	+ve	-ve	+ve	-ve	+ve	-ve
Male	13(14.4%)	0	13(14.4%)	0	4 (4.4%)	9(10.0%	9(10.0%)	4(4.4%)
female	77(85.6%)	0	77(85.6%)	0	27(30.0%)	50(55.6%	40(44.4%)	37(41.1%)
Total	90(100%)	0	90(100%)	0	31(34.4%)	59(65.6%	49(54.4%)	41(45.6%)

Table 2. IgM and IgG anti-parvovirus B19 in different age groups

Age groups		Results			
		IgM		IgG	
		+ve	-ve	+ve	-ve
10 - 24 years	Count	3	10	10	3
	%	3.3%	11.1%	11.1%	3.3%
25 – 45 years	Count	16	26	19	23
	%	17.8%	28.9%	21.1%	25.6%
> 45 years	Count	12	23	20	15
	%	13.3%	25.6%	22.2%	16.7%

Table 3. Distribution of study subjects according to their occupation

		IgM		IgG	
		+ve	-ve	+ve	-ve
Solger	N	1	2	1	2
	%	1.1%	2.2%	1.1%	2.2%
worker	N	7	12	13	6
	%	7.8%	13.3%	14.4%	6.7%
student	N	4	13	10	7
	%	4.4%	14.4%	11.1%	7.8%
house wife	N	19	31	24	26
	%	21.1%	34.4%	26.7%	28.9%
No work	N	0	1	1	0
	%	0%	1.1%	1.1%	0%
Total	N	31	59	49	41
	%	34.4%	65.6%	54.4%	45.6%

Figure 1. Age group distribution among study population