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ORIGINAL ARTICLE

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Clinical presentations of chlamydial and non-chlamydial reactive arthritis

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Abstract The aim of this study was to investigate the triggering micro-organisms and the clinical as well as laboratory differences between Chlamydial and non-chlamydial reactive arthritis (ReA) in a prospective study on 98 patients with acute/subacute arthritis. An inciting organism was found in 42 patients. Eighteen of these were chlamydial. Fifty-seven percent of all ReA patients were carriers for HLA-B27, which increased to 67% in the chlamydial group. Chlamydial ReA patients had more urethritis ($P < 0.05$) with a longer period between arthritis and inciting infection, significantly lower CRP levels, and involved joint counts ($P < 0.05$). Additionally, sacroiliitis was more frequent besides extra-articular manifestations in chlamydial ReA group. This study shows that chlamydial ReA differs in some points from non-chlamydial ReA, which in turn may affect the evaluation of an arthritic patient. ReA due to chlamydia more frequently encompasses a monoarticular or oligoarticular clinical picture with predominant distal extremity involvement. Non-chlamydial ReA presents higher joint counts and may involve upper extremity joints.

Keywords Reactive arthritis · Chlamydial reactive arthritis · Oligoarthritis · Non-chlamydial reactive arthritis

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Introduction

Reactive arthritis (ReA) is an aseptic inflammatory arthritis, which can be triggered by a wide spectrum of microbial agents including bacteria as well as viruses and parasites [1, 2]. The definition comprises an episode of merely asymmetric, oligoarticular, inflammatory arthritis within 1–4 weeks of an appropriate infection. It occurs frequently in genetically predisposed patients [3]. ReA has a worldwide distribution with a peak age of 20–40 years [4].

The usual entrances of triggering infectious agents are the gastrointestinal and urogenital routes. Enteroarthritis appears equally in both sexes, while uroarthritis is seen more frequently in men. Some other micro-organisms may enter the body through dermis, lungs, or upper respiratory routes [2, 5].

ReA reflects similar pathogenetic, clinical, radiological, and genetic properties. But different clinical pictures may ensue because of very different kinds of triggering agents.

The aim of this study was to investigate clinical and laboratory findings in patients with ReA and to demonstrate the clinical and laboratory differences between chlamydial and non-chlamydial ReA.

Materials and methods

This study was carried out monocentrically in the Department of physical medicine and rehabilitation during the time period of 2001–2003. The participants consisted of consecutive out- and inpatients who fulfilled the inclusion criteria. Patients who had microbiological and serological proof of ReA, and who had a history of urethritis or enteritis within the preceding 1–4 weeks were included in the study. ReA diagnosis was based upon the diagnostic criteria proposed by Calin [6]. Arthritic pattern was classified according to the number of joints involved. Additionally in physical examination,

extra-articular signs were investigated. For *Chlamydia trachomatis*, urethral swab, which has been accepted as an effective method, was used [7]. To explore the possible inciting agent, the following set of investigations were done in most of the patients. The study was approved by the local ethical committee and patients were informed orally.

Synovial, prostate fluid, and throat specimens were inoculated to 5% sheep blood, eozine methylen blue (EMB), and 5% sheep blood chocolate agars for classical procedures. Blood and EMB agars were incubated at room temperature whereas chocolate agar was incubated at an atmosphere of 5% CO_2 at 37°C in the incubator for 24–48 h. Gram stain and motility tests were done from the colonies. The identification was performed in accordance with oxidase, catalyze, optochin, susceptibility, and bile solubility tests. When needed, automotized identification systems were used like API (Biomeriux—France). Urine samples were collected by obtaining the midstream flow by clean-catch technique and inoculated to 5% sheep blood and EMB agars by quantitative technique. Gaita specimens were inoculated to Selenit-F media, then incubated to EMB media for the identification of Salmonella and Shigella bacteria. The strains were identified by biochemical procedures and confirmed by API (Biomeriux) automotized system. The strains were serotyped by lam agglutination procedure by using poly and monovalan antiserum.

For mycobacterial identification prostate fluid and urine specimens were homogenized and decontaminated by N-asetil-L-sisteinNaOH (NALC-NaOH) procedure. Preparated samples were stained by using Ziehl–Neelsen method. The identification was done by BACTEC 460 TB radiometric procedure.

The identification of *Salmonella* spp. was performed by Gruber-Widal agglutination test. *Salmonella typhi-O*, *S. typhi-H*, *Salmonella paratyphi-AO*, and *S. paratyphi-BO* antigens were used for serotyping of *Salmonella* spp. In *Brucella* spp. Wright agglutination test was used for serotyping. *Mycoplasma hominis* and *Ureaplasma urealyticum* antigens were detected by ELISA in urine. In detection of *C. trachomatis* antigen, urethral smear was taken for ELISA test. *Lyme* total, Cytomegalovirus, Epstein-Barr, and Rubella virus identifications were done by ELISA test. HbS Ag, Anti HCV, and Anti HIV 1–2 antibodies were detected by ELISA procedure by using Equipan kit. *Chlamydia pneumonia* antibody was detected using micro immunofluorescence procedure.

Electrocardiography was obtained for all patients. In necessary conditions, patients were also evaluated with echocardiography. In 83.3% of patients, HLA B27 serotyping was done. Sacroiliac X-ray was obtained for patients, and specific region graphies when necessary.

Results

Ninety-eight patients with acute and subacute arthritis/arthralgia were included in the study. All patients had a clinical picture consistent with ReA. All of them were examined for an evidence of inciting organism. Of the 98 patients, triggering agents in 42 have been established (Table 1). Thirty-one of these 42 patients with confirmed triggering agent were male (76.2%). Mean age was 27.2 ± 9.6 years. Mean disease duration was 15.9 ± 17.7 weeks.

Of these 42 patients, 18 were incited by Chlamydia species (*C. trachomatis* in 15 and *C. pneumonia* in three). Causes of the rest included 11 different micro-organisms (Table 1). Fifty-seven percent of the patients were positive for HLA-B 27. While sacroiliitis was present in half of the HLA B27 (+) patients, it was present in only 26.6% of the HLA B27 (-) patients. The difference had some statistical significance ($P = 0.054$).

The patients were divided into two groups named chlamydial and non-chlamydial ReA. Data of both groups were compared (Table 2).

Urethritis or dysuria was significantly more frequent in the chlamydial group than in the non-chlamydial group ($P = 0.005$). Swollen joints of all cases have been counted. Chlamydial ReA group had significantly less swollen joint count ($P = 0.002$) as well as painful joint count ($P < 0.04$). Chlamydial ReA group had more monoarthritis and less oligoarthritis, but the difference was not significant ($P > 0.05$, respectively). No one in the chlamydial ReA group had polyarthritis in contrast to non-chlamydial group. But this difference did not reach a statistical significance ($P = 0.07$). Although there was no significant difference between the two groups with regard to upper and lower extremity involvement ($P > 0.05$), chlamydial group bore no involvement in shoulder, elbow, and hand PIP joints.

CRP values in chlamydial group were significantly lower than in the non-chlamydial group. ($P = 0.001$). Erythrocyte sedimentation rate (ESR) however had no significant difference between groups ($P = 0.17$).

In total, 16.6% of chlamydial ReA and 30% of non-chlamydial group patients entered a chronic phase lasting over 6 months, but this difference was not statistically significant ($P > 0.05$). The frequency of radiological changes including sacroiliitis, joints space narrowing, and erosions did not show any statistical significance ($P > 0.05$) as other assessed parameters ($P > 0.05$).

Six out of 18 (33%) chlamydia induced patients who predominantly showed knee and ankle involvement, had monoarthritis, while ten (55%) had asymmetric oligoarthritis. Two patients had only sacroiliitis. Eleven patients presented extra-articular findings: tendinitis (22%) in four, enthesopathy in seven (39%), keratoderma blennorrhagica in one, aphtous ulceration in three (17%), conjunctivitis in four (22%). None of the patients in chlamydial ReA group showed lesions like dactylitis, erythema nodosum, nail lesion, and balanitis. One patient exhibited P-R elongation in ECG and one other showed mitral valve insufficiency by echocardiography. There was no statistically significant difference between groups with regard to extra-articular manifestations ($P > 0.05$). Radiologically, seven patients had

Table 1 Laboratory procedures and obtained micro-organisms

	Total number of tests	Number of positive tests	%	Obtained micro-organisms
Urethral swap	47	15	31.9	C. trachomatis
Microimmunofluorescence	75	3	4	C. pneumoniae
ELISA	36	4	11.1	*M. hominis* ± *U. urealyticum*
Wright aglütinasyon	36	4	11.1	*Brucella* spp.
Gruber-widal agglutination	50	3	6	*Salmonella* spp
Throat culture	50	3	6	Group Aβ h. streptococcus
Urine	50	1	2	K. pneumonia
Gaita microscopy	50	2	4	*G. intestinalis*
Lyme total	50	2	4	*Borrelia burgdorferi*
Urinary culture	50	1	2	*Neisseria gonorrhea*
Eozine methylene blue (*EMB*)	50	1	2	*S. flexneri*
Erhlich zieel neelsen (*EZN*) *-staining, PCR*	50	2	4	M. tuberculosis
ELISA	50	1	2	*Hepatitis C Virus*

Table 2 Data of chlamydial and non-chlamydial ReA along with whole ReA groups

	All ReA	*Chlamydial* ReA	Non-chlamydial ReA	*P*
No. Of the patients	42	18	24	
Sex (M/F)		15/3	16/8	
Mean age ± SD	27.2 ± 9.6	24.1 ± 3.8	29.6 ± 11.9	> 0.05
Symptoms at the beginning (%)				
Urinary	37.5	55.6	33.3	= 0.005
Gastrointestinal	23.9	11.1	32.1	> 0.05
Upper airway	11.4	5.6	14.8	> 0.05
Disease duration (week ± SD)	15.9 +/−17.7	15.7 ± 15.15	16.0 ± 19.7	> 0.05
Involved joint count (mean ± SD)	3.6 ± 2.97	2.6 ± 1.4, 1–5	4.5 ± 3.5, 1–17	< 0.05
Swollen joint count (mean ± SD)	2.14 ± 1.89	1.1 ± 1.3	2.9 ± 1.9	= 0.002
Painful joint count (mean ± SD)	3.66 ± 2.99	2.8 ± 1.4	4.5 ± 3.5	= 0.043
Monoarthritis (%)	23.8	33.3	16.7	> 0.05
Oligoarthritis (%)	45.2	55.5	58.3	> 0.05
Poliarthritis (%)	7.1	0	12.5	= 0.072
Back pain (%)	51.2	55.6	47.8	> 0.05
Extra-articular manifestations (%)	55	61.1	50.0	> 0.05
Tendonitis	25	22.2	27.3	> 0.05
Enthesopathy	25.6	38.9	14.3	= 0.08
Dactylitis	10	0	18.2	= 0.06
Talalgia	22.5	33.3	22.7	> 0.05
Conjunctivitis	15	22.2	9.1	> 0.05
Balanitis (in male)	2.7	11.1	4.3	> 0.05
Erythema nodosum	2.3	0	3.3	> 0.05
Keratodermia	12.5	5.6	18.2	> 0.05
Oral ulceration	10.3	16.7	4.8	> 0.05
Nail lesion	2.3	0	3.4	> 0.05
Cardiovascular manifestations	10	11.1	9.1	> 0.05
Sacroiliitis	34.1	38.9	30.4	> 0.05
HLA B27 positivity (%)	57.1	67	42.1	< 0.05
CRP (mg/dl)	49.1 ± 55.6	19.1 ± 14.6	71.8 ± 65.4	= 0.001
ESR (mm/h)	45.1 ± 28.1	38.1 ± 25.8	50.5 ± 29.3	> 0.05

sacroiliitis and 67% were positive for HLA-B27. The higher frequency of HLA-B27 showed statistical significance ($P = 0.005$) compared with the non-chlamydial group.

Four patients with positive evidence for *M. hominis* and/or *U. urealyticum* had dysuria prior to arthritis. In these patients, knee, wrist, and ankles were predomonantly involved, whereby two of them had oligoarthritis, one had monoarthritis, and the other had polyarthritis. Two patients suffered morning stiffness and had extra-articular findings like tendinitis, enthesopathy, keratoderma blennorrhagica, and conjunctivitis. The patient with polyarthritis had sacroiliitis while the one with monoarthritis had a marginal erosion and joint space narrowing in knee joint. All four patients were negative for HLA-B27 (Table 3).

Four patients had elevated titers in the wright agglutinasyon test. Of them, one presented monoarthritis and sacroiliitis, two had oligoarthritis and polyarthritis in addition to sacroiliitis, while one had only sacroiliitis. All patients suffered inflammatory back pain, while three of them suffered lumbar flexion restriction in

Table 3 Distribution of joint involvements and other clinical and laboratory findings in our chlamydial and non-chlamydial ReA patients with the comparison of Eberl and Zeidler's studies

Joint	ReA	Eberl [19]	Chlamydial ReA	Non-chlamydial ReA	Zeidler [21]
Shoulder	7.5		0	12.5	
Elbow	10		0	16.7	
Wrist	20	8.9	6.3	29.2	45
Hand joints	15	13.3	6.3	25	
Hip	15	6.7	12.5	16.7	
Knee	62.5	48.9	68.8	58.3	70
Ankle	78	33.3	70.6	83.3	57
Foot joints	26.8	24.4	23.5	29.2	35
HLA-B27	47.6	60	67	33.3	
G-U Symptoms	40	8.9	55.6	33.3	
Enteral symptoms	23.9	13.3	11.1	32.1	
Conjunctivitis	16.3	2.2	33.3	9.1	
Enthesopathy	28.6		38.9	14.3	
Sacroiliitis	34.1	8.9	38.9	30.4	
Back pain	42.9	38	55.6	47.8	
CRP	49.1		19.1	71.8	
ESR	45.3		38.1	50.5	

addition. Four of them presented tendinitis, three enthesopathy and aphtous ulceration, while one presented keratoderma blennorrhagica and dactylitis. One patient had sacroiliitis and plantar spurs, others had Achilles enthesopathy and sacroiliitis. Two of the cases were positive for HLA-B27 (Table 4).

Three patients with high titers for group agglutination test reported diarrhoea prior to symptoms. Two patients had an oligoarticular involvement while one other had only sacroiliitis. All patients presented extra-articular findings like tendinitis, enthesopathy, dactylitis, and plantar hyperkeratosis. Two patients had sacroiliitis and were positive for HLA-B27 (Table 4).

Patients who grew group Aβ *Hemolytic streptococcus* had higher ASO titers. Two patients had non-migratory asymmetric (knee and ankle) involvement and the other one had a symmetric joint involvement affecting both wrists 10 days after the upper respiratory infections. One of the patients suffered inflammatory back pain, a sign of axial involvement. One of them had lumbar flexion restriction. One of the patients was detected through echocardiography to have had Grade I mitral and aortic insufficiency, which was regarded as a sign of previous carditis (Table 4).

The patient with *Klebsiella pneumonia* had a history of urinary infection. He had polyarticular involvement along with plantar keratoderma, tendinitis, enthesopathy, balanitis circinate, dystrophic nail changes, and bilateral conjunctivitis. He was positive for HLA-B27.

One of the two patients with evidence of G. Intestinalis in stool had diarrhoea prior to arthritis. The other one, who already had urethritis, had no diarrhea. One of them had monoarthritis and the other one had oligoarthritis along with sacroiliitis. Both were negative for HLA-B27.

Two patients with *Lyme* total Ab had oligoarthritis with no extra-articular manifestations and were HLA-B27 (-). One of them had hand arthritis while the other showed distal extremity and hand joint involvement. The first one experienced two to three erythematous it-

Table 4 Clinical involvement patterns according to inciting agents in the non-chlamydial ReA patients

	Mycoplasma	Brucella	Salmonella	Giardia	PSReA*
No.	4	4	3	2	3
Shoulder	1/4	0/4	1/3	0/2	0
Elbow	1/4	2/4	0/3	1/2	0
Wrist	3/4	1/2	1/3	1/2	1/3
Hand joints	3/4	1/2	1/3	1/2	0/3
Hip	0/4	2/4	1/3	0/2	0/3
Knee	4/4	3/4	1/3	1/2	2/3
Ankle	4/4	4/4	2/3		2/3
Foot joints	1/4	2/4	0/3	1/2	2/3
HLA-B27	0/4	2/4	2/3	0/2	0/3
Enthesitis	1/2	2/4			
Sacroiliitis	1/4	3/4	2/3	1/2	0/3
Extra-articular manifestations			100		2/3
Back pain	3/4	4/4	2/3		2/3
Keratodermia	1/4	1/2	1/3	0/2	0/3
Conjunctivitis	1/4			1/2	1/3

**PSReA* Poststreptococcic ReA

chy lesions of 1–2-cm diameter. The second one did not report any insect bite. Both patients were diagnosed as having FMS.

Mycobacterium tuberculosis was detected in two patients by PCR. One of them had polyarthritis and the other one had oligoarthritis and sacroiliitis. The one with polyarticular involvement pattern had shoulder, elbow, wrist, ankle, and finger joint arthritis. Both of them had predominant dactylitis. Treatment of both patients with antituberculous treatment resulted in complete recovery. Both patients were positive for HLA-B27.

The patient with confirmed gonorrhoea infection prior to symptoms showed arthritis of ankle and finger joints. He had no other system pathology and was positive for HLA-B27.

A patient with symptoms occurring after a HCV infection had wrist, ankle arthritis, Achilles enthesopathy, and tendinitis. HLA-B27 could not be determined.

The patient with arthritis after *Shigella flexneri* infection presented acute phase. He had monoarthritis along with long lasting diarrhoea and high fever.

Discussion

The most frequent cause of an inflammatory arthritis in a young man or woman is ReA [3, 8, 9]. Some viruses and parasites along with bacteria may incite ReA [4]. Although a wide clinical spectrum from simple arthralgias to severe polyarthritis may be seen, its classical pattern presents an acute, asymmetric, and ascendant inflammatory oligoarthritis with predominantly distal extremity involvement. In this study, the possible triggering agents were detected in 42.9% of the patients. This ratio approximated with those of previous studies reporting detection rates of 50–70% [10–12]. Improvement in detection techniques will increase this ratio [13], but cost is the main limiting factor.

We compared the data of 18 chlamydial and 24 non-chlamydial ReA patients. *C. trachomatis* induced ReA, which has been announced to be the possible cause of 10% of all inflammatory arthritides, may encompass various pictures like enthesitis, peripheral arthritis, pelvis-axial syndrome, and extraskeletal manifestations [8, 13]. In the present study, while 15 of the chlamydial ReA were caused by *C. trachomatis*, the rest was caused by *C. pneumonia*. This ratio is compatible with the data in literature. *C. trachomatis* was found to be the triggering agent in 35% of 83 patients in one study [12]. *C. pneumonia* was detected in 6.7–10% of the patients in two other studies [11, 14]. While enteroarthritis appears equally in both sexes, uroarthritis has a male preponderance [3, 10, 15]. In the present study, the male preponderance was overt, possibly as a result of the fact that our academy hospital mainly serves national service personnel. While one of the three patients in our chlamydial group had high *C. pneumonia* Ig G and M titers, the other two had increased IgG titers only. The increase in IgG titer alone was accepted as a re-infection as suggested in literature [14].

Mean age, male/female ratio, mean disease duration, and HLA-B27 positiveness in chlamydial arthritis have been reported to be 35.8, 5/4, 4 months, and 55.2%, respectively [12]. The differences in mean age and male/female ratio were possible as a result of the patient profile of our academy hospital. The mean disease duration was consistent with literature. Although the time interval between the infective process and the arthritic event seemed a little longer with regard to the definition of ReA, it has been reported that the time may be longer in chlamydial ReA [16].

Fink et al. and Hannu et al. reported the mean ESR in their study groups as 62 and 75.5 mm/h, respectively [17, 18] which was inconsistent with our data. In the present study, ESR was somewhat low. However mean CRP value, a more sensitive reactant to tissue injury, was significantly high. Additionally, the mean ESR and CRP values in chlamydial arthritis group were lower than in the non-chlamydial group, inconsistently with previous studies (Table 2) [19].

The patients with ReA in the present study carried HLA-B27 at the rate of 57.1%. This ratio increased to 67% in chlamydial ReA patients, which has been reported as high as 54–75% in literature [20, 21]. Three patients triggered by *C.pneumonia* were positive for HLA-B27. Non-chlamydial ReA group however had a lower frequency but higher rates in Brucella and Salmonella ReA group. Both patients with Tb ReA (although a disputed definition in literature) were positive for HLA-B27. HLA B27 prevalence in mycoplasmal ReA patients has been reported identical to normal population, similar to our patients, who were HLA-B27 (-) [12]. On the other hand, our Borrelia and Giardia patients, likewise, were HLA-B27 (-), in consistency with normal population. However, high rates have been reported in literature with regard to Giardia. As our group has few patients, interpretation presents some difficulty [22, 23].

Back pain is a frequently encountered complaint secondary to sacroiliitis [8]. Sacroiliitis, uveitis, aortitis, and spondylitis have been reported to be related to HLA-B27 [1]. However, Weyand et al. reported that HLA B27 is a risk factor for oligoarthritis independent of its relation to sacroiliitis [12]. In the present study, 38.9% of chlamydial ReA patients had sacroiliitis, which is consistent with literature. However, this ratio increased up to 54% in HLA-B27 (+) patients. The high ratio of both low back pain and sacroiliitis in HLA-B27 positive patients seems inconsistent with the previous suggestion [12].

The most affected joints are knee, ankle, and MTP joints in ReA, frequently in mono- or oligoarticular arthritis pattern. Upper extremities' involvement comprises an asymmetric elbow, wrist, and finger involvement [4, 15]. In the present study, there were monoarthritis in 23.2%, oligoarthritis in 45.2%, and polyarthritis in 7.1% of the patients. This ratio differed

between chlamydial and non-chlamydial groups, with a predominance of monoarthritis in the chlamydial and oligoarthritis in the non-chlamydial group. This finding was consistent with the data obtained in a multicenter study by Doury et al., which compared 58 chlamydial and 41 non-chlamydial ReA patients [24]. They reported that in the group with chlamydial ReA, monoarthritis was more frequent and involvement of the knees, hands, wrists, dactylitis, and heel pain were rarer than in non-chlamydial ReA. Patients in our chlamydial group had less frequent joint involvements with regard to total involved joint count. The general arthritis pattern was asymmetric and distal. None of the chlamydial ReA group showed shoulder, elbow, or phalangeal involvement. They had a higher frequency of knee and ankle joint involvement than literature (Table 3). Zeidler and Wollenhaupt reported that in their study, ReA patients had knee arthritis in 70%, ankle in 57%, MTP joints in 35%, and wrist and finger joints in 45% [21]. Non-chlamydial ReA affected both upper and lower extremity joints in contrast to chlamydial ReA, which predominantly involved distal joints. In our patients, polyarthritis was more encountered in non-chlamydial group.

Besides *Chlamydia*, *Mycoplasma* has also been incriminated as a cause of urogenital contagious disease related ReA. It has been reported to involve preferentially the upper extremity joints with a tendency of symmetric polyarthritis as occurred in two of our cases (Table 4). Brucella, although it rather frequently causes septic conditions, is a rare cause of spondylitis and ReA. Brucella ReA is predominantly polyarticular and intermittent with a tendency to self-restriction [4]. Dubost et al. reported different clinical signs as oligoarthritis, dactylitis, heel pain, and sacroiliitis in their patients who were positive for HLA-B27 [25]. Ozgul et al. reported three cases of acute Brucella sacroiliitis, with two of them confirmed by bone scanning [26]. We observed an oligoarticular pattern tending to involve distal extremity joints, and sacroiliitis in half of the patients (Table 4).

Maeki-Ikola reported the incidence of ReA following *Salmonella* infection as high as 1.2–7.3%. Another study reported ReA cases with a history of enterocolitis at a rate of 76%. The most frequently involved joints are the elbow and knee joints. More than 35% of the patients have a severe disease with symptoms lasting for more than 3 months [27, 28]. All of our patients with Salmonella ReA had a history of enteritis and had higher counts of joint involvement with a tendency to distal parts of the extremities. ReA due to *Giardia intestinalis* (*lamblia*) in our group presented mono- or oligoarthriticular involvement, typically appearing 2–3 weeks after GI symptoms as reported in literature [23, 29] (Table 4).

Poststreptecoccal ReA may cause a non-migratory oligo- or polyarthritis in most cases. Three patients in our group with similar clinical and laboratory properties were labeled as PsReA [5, 30]. One HLA-B27 (+) patient had signs of earlier carditis. Although he could have had ARF, he was diagnosed as PsReA in concordance with a previous report [30].

Tb ReA is merely a disputed diagnose. It is widely known that a classical ReA may follow BCG immunization in some cases with malignancies. Our cases were confirmed via PCR and recovered completely with anti-Tb treatment.

Klebsiella has been criticized to have a relation with AS. Its relation with ReA has been found following a urinary infection or diarrhea [5]. Our patient with *K. pneumonia* showed typical clinical properties of ReA.

In the present study, knee and ankle joint involvement, and extra-articular manifestations were higher than the rates in literature [19] (Table 3). The chlamydial ReA group presented more extra-articular manifestations, when compared with non-chlamydial ReA group in concordance with the study of Hannu et al. The non-chlamydial group however had differing rates of extra-articular manifestations with highest rates in Salmonella-induced ReA (Table. 3 and 4). However, it should be noted that the non-chlamydial group presents more ratios in frequency of tendinitis, keratoderma, sausage finger, and nail lesions.

In conclusion, ReA may present different clinical pictures. Careful history taking may explore the genitourinary or enteral symptoms. ReA due to chlamydia more frequently encompasses a monoarticular or oligoarticular clinical picture with predominant distal extremity involvement. In non-chlamydial ReA, however, more joint numbers may be involved and upper extremity joints are not spared. The clinical and laboratory properties of chlamydial ReA differ somewhat from other ReA.

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