



POINT OF CONFORMITY OF THE 1987 ACR AND 2010 ACR/EULAR RHEUMATOID ARTHRITIS CLASSIFICATION CRITERIA: A HOSPITAL BASED STUDY

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ABSTRACT

Introduction: The 1987 ACR classification criteria, generally used as ingress criteria to clinical trials and observational studies. In 2010, fresh categorization criteria for RA were built up. **Objective** To measure conformity between 1987 American College of Rheumatology (ACR) and 2010 ACR/European League Against Rheumatism (EULAR) criteria.

Method: The present study is based on 290 clinically suspected RA patients. Cross-sectional study design was used. Clinically suspected cases were referred by different OPD's of Sir Sunderlal Hospital for screening. About 2-ml of blood samples were collected in plain vial from each patient and each sample were tested by the laboratory technician.

Result: Level of agreement showed slight agreement between diagnostic tests in which 7 subjects displayed positive as agreed by both diagnostic tests. In addition, Both tests agreed that there were 216 subjects who displayed negative. Therefore, there were 67 individuals for whom the both tests could not agree on their results.

Conclusion: The ACR/EULAR criteria carry out significantly better than the 1987 ACR criteria for forecasting opinion of RA

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INTRODUCTION

Rheumatoid arthritis (RA) is a continual, corrosive inflammatory arthritis reflection to influence roughly 1% of the UK adult population.¹ Freshly it has been publicized that insistent premature handling can avoid much of the long term harm connected with the RA.²

Analysis of RA might be complex at the premature phases of the ailment. Even if not planned for diagnostic reasons, the 1987 American College of Rheumatology (ACR) classification criteria might assist to recognize RA patients.³ The 1987 ACR reference point do not effort well in premature phase RA.⁴ A latest set of RA classification criteria was freshly projected mutually by the ACR and the European League Against Rheumatism (EULAR). 2010 criteria aim to identify patients with RA at disease onset and their first visit to the rheumatologist. In these criteria, the experts in charge of their development defined a new paradigm for early RA, enabling the deliberation of RA in patients with unfinished appearance.⁵

The 1987 ACR classification criteria, generally used as ingress criteria to clinical trials and observational studies, were extended in a cohort of patients with recognized,

long-lasting ailment and are recognized to carry out badly in patients nearby with fresh onset inflammatory arthritis, who may assistance generally from early rigorous management. The 2010 ACR/EULAR classification criteria for RA try to have enhanced sensitivity equated with the 1987 criteria. In particular, the 2010 criteria were planned to superior classify RA in patients nearby shortly later than the improvement of signs and symptoms of the ailment.⁶

In 1987, the ACR built up classification criteria for RA to progress the consistency of patient populations registered in clinical trials.⁷ These criteria steadily expanded reputation for analysing RA in day by day clinical practice. On the other hand, the 1987 ACR criteria have incomplete diagnostic correctness for premature phase RA,⁸⁻¹⁰ even after the addition of anti-citrullinated peptide antibody (ACPA) titre.¹¹ In 2010, a board of specialists from the ACR and EULAR unveiled a latest set of classification criteria designed for RA.¹²

We expected to match up to the 1987 ACR and the 2010 ACR/EULAR classification criteria to inspect their presentation descriptions and the characteristics of members classified as having RA by the two unlike systems.

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MATERIALS AND METHODS

Study population

We used data from a cohort of 290 clinically suspected patients included prospectively between August 2012 and February 2014 in UGC Advanced Immunodiagnostic Training and Research Centre (AITRC), Department of Pathology, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh. The subjects were concerning by various OPD's of Sir Sunderlal Hospital, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh. The study was agreed by the suitable ethics committee, and on paper informed consent was obtained from each patient prior to inclusion.

Study design

All items of ACR 1987 and ACR/EULAR criteria were assessed at baseline. The baseline assessment included a standardized interview, The respondents were interviewed personally by the investigator to get first hand information as well as the real picture of their limbs involves through direct observation and 2-ml of blood samples were collected in plain vial from each patient and each sample were tested for diagnostic tests RF, CRP and AntiCCP by using RF-Latex, CRP Latex and ELISA method respectively by the laboratory persons.

Application of the criteria at baseline

The 1987 ACR criteria were measured positive in subjects with at least four of the subsequent:

- morning stiffness greater or equal to 1 hour;
- arthritis of three or more joint areas;
- arthritis of hand joints;
- symmetric arthritis;
- rheumatoid nodules;
- rheumatoid factor (positive);
- radiographic changes.¹³

The 2010 ACR/EULAR criteria were considered positive in patients with no other diagnosis explaining the symptoms and with either erosions typical for RA or a score greater or equal to 6/10:

- joint involvement (1 medium-large joint: 0 points; 2 to 10 medium-large joints: 1 point; 1 to 3 small joints: 2 points; 4 to 10 small joints: 3 points; 10 joints with at least one small joint: 5 points);
- serology (no rheumatoid factor [RF] or ACPA: 0 point; low positive RF and/or ACPA [less than 3 times the upper limit of normal for the laboratory and assay]: 1 point; high-positive RF and/or ACPA [more than 3 times the upper limit of normal for the laboratory and assay]: 3 points);
- synovitis duration (less than 6 weeks: 0 point; greater or equal to 6 weeks: 1 point) and acute-phase reactants (C-reactive protein [CRP] and erythrocyte sedimentation rate [ESR] normal: 0 point; CRP and/or ESR elevated: 1 point).¹⁴

Statistics

The agreement between the two criteria was based on the κ statistic. Express associated variables in cross tabulated form for both the diagnosis criteria '1987 Rheumatoid Arthritis Classification' and 'The 2010 American College of

Rheumatology/European League Against Rheumatism classification criteria' for rheumatoid arthritis. The responses received through the interview schedule were coded, grouped, processed and tabulated. Data were entered into MS-Excel spreadsheet and importing the Excel spreadsheet into SPSS 16.0(Banaras Hindu University) for analysis.

RESULTS

Total of 290 study subjects, in which 48(16.6%) were positive by ACR/EULAR 2010 criteria and 33 (11.4%) were positive by ACR 1987 criteria. In ACR/EULAR 2010 criteria the adolescent age group to middle age group, the positivity is directly proportional to the age i.e., as the age group increases the positivity rate also increases. In the age group (41-60 years) positivity percentages were slightly decreases as compared to age group (21-40 years). Half of the total RA patients belongs to age group (21-40 years), this group is more vulnerable and exposed to several risk factors (like food habit, milk consumption, type of occupation etc.) associated with RA. The positivity of RA was lower among subjects in the age group greater than 60 years (6.2%), The positivity of 16.7% among children including juvenile in the age group (0-20 years). Whereas in ACR 1987 criteria age group (41-60 years) positivity percentages were slightly decreases as compared to age group (21-40 years). Approximately half of the total RA patients belongs to age group (21-40 years), this group is exposed to a number of risk factors associated with RA. The positivity of RA was lower among subjects in the age group greater than 60 years (3.0%), The positivity of 21.2% among children including youth in the age group (0-20 years).

In both the criteria positivity was higher in female than male. In ACR/EULAR 2010 criteria RA patients residing in rural areas (66.7) had more positivity than urban areas (33.3%) and

Table 1 Comparison of study subjects with respect to socio-demographic and environmental characteristics according to ACR/EULAR 2010 criteria and ACR 1987

| S. No. | Variables | ACR/EULAR 2010 criteria RA(%) 48(16.6%) | ACR 1987 criteria RA(%) 33(11.4%) |
|--------|--------------------|--|--------------------------------------|
| 1 | Age Group | ≤ 20 | 7(21.2) |
| | | 21-40 | 14(42.4) |
| | | 41-60 | 11(33.3) |
| | | >60 | 1(3.0) |
| 2 | Gender | Male | 10(30.3) |
| | | Female | 23(69.7) |
| 3 | Food Habits | Veg. | 17(51.5) |
| | | Non- Veg. | 16(48.5) |
| | | Student | 11(33.3) |
| | | House wife | 14(42.4) |
| 4 | Occupation | Farmer | 1(3.0) |
| | | Working | 6(18.2) |
| | | Person | 3(6.2) |
| | | Other | 1(3.0) |
| 5 | Type of Occupation | Sedentary | 19(57.6) |
| | | Active | 14(42.4) |
| 6 | Family | Yes | 6(18.2) |
| | | No | 27(81.8) |
| 7 | Place of Residence | Urban | 11(33.3) |
| | | Rural | 22(66.7) |
| 8 | Education | ≤ Primary | 14(42.4) |
| | | Primary to Inter | 14(42.4) |
| | | >Inter. | 5(15.2) |
| 9 | Milk consumption | Yes | 13(39.4) |
| | | No | 20(60.6) |

positivity rate of RA patients who had family history of RA was one - third of those who had no family history of RA. while on the contrary ACR 1987 criteria also shows same proportion of rural urban population and total RA patients 18.2% patients who had family history of RA.

Among all clinically suspected subjects directly consuming milk, milk product or consumption of milk in any form, in which 14.3%, Positivity in non vegetarian as compared to vegetarian was higher i.e., (56%) were RA by ACR/EULAR 2010 criteria. While according to ACR 1987 criteria 39.4% among total RA patients consuming milk, milk product or consumption of milk in any form and non vegetarian (48.5%) as compared to vegetarian (51.5%).

Table 1 reveals the positivity rates among the study subjects with respect to their educational status according to ACR/EULAR 2010 were. 39.6% RA patients having educational qualification less than primary. And after primary as educational level of RA patients under study had increased, their positivity rate had reduced.

The distribution of positivity rate among the clinically suspected cases according to their occupation is also shown in above table. The positivity was highest in housewives which contribute approximately half of the total RA patients. Followed by student category were showed 20.8% RA patients. The positivity rate in the working person was - 14.6%. Out of total RA patient table shows that minimum percentage of farmers 6.2% and others (6.2), other includes unemployment retired person etc.

Subsequent to occupation observed their types, table shows that out of total RA patients 68.8% has sedentary livelihood. At the same time as, according to ACR 1987 , 42.4% having educational qualification less than primary only 15.2% having educational qualification higher than intermediate and positivity was highest in housewives which contribute approximately half of the total RA patients. Followed by student category were showed 33.3% RA patients. The positivity rate in the working person was 18.2%. Out of total RA patient table shows that minimum percentage of farmers 3.0% and other (3.0), other includes unemployment retired person etc.

Table 2 reveals the level of agreement between 1987 ACR and 2010 ACR/EULAR criteria employing the following methods.¹⁵

Observer 1-

| | | | | |
|--------------------|-------|----------|----------|-------|
| | | Yes | No | Total |
| Observer 2- | Yes | a | b | m1 |
| | No | c | d | m0 |
| | Total | n1 | n0 | n |

(a) and (d) stand for the number of times the two observers concur while (b) and (c) represent the number of times the two observers differ. If there are no discrepancies, (b) and (c) would be zero, and the observed agreement (po) is 1, or 100%. If there are no agreements, (a) and (d) would be zero, and the observed agreement (po) is 0.

Calculations: Expected agreement

$$pe = [(n1/n) * (m1/n)] + [(no/n) * (mo/n)]$$

In this example, the expected agreement is:

$$pe = [(48/290) * (33/290)] + [(257/290) * (242/290)] = 0.02 + 0.73 = 0.75$$

The observed agreement is merely the sum of (a + d) divided by the total n in Table 2. In present study, this is (7+216)/290 or 0.77

Kappa, K

$$= \frac{(po-pe)}{(1-pe)} = K = 0.08 \text{ (Shows slight agreement between diagnostic tests)}$$

Table 2 Comparison between diagnostic tests ACR/EULAR 2010 and ACR 1987 criteria

| | | ACR 1987 | | |
|-------------------------|--------|----------|--------|-------|
| | | RA | Non-RA | Total |
| ACR/EULAR 2010 Criteria | RA | 7 | 41 | 48 |
| | Non-RA | 26 | 216 | 242 |
| | Total | 33 | 257 | 290 |

Table 2 shows that out of 290 study subjects, 7 subjects showed positive as agreed by both diagnostic tests. In addition, Both tests agreed that there were 216 subjects who displayed negative. Therefore, there were 67 individuals (i.e., 26 + 41 = 67) for whom the both tests could not concur on their results. The 2010 ACR/EULAR criteria were developed with the aim of classifying early RA in particular. While past studies have examined the performance of these new criteria in the classification of early arthritis patients in several clinical settings,¹⁶⁻²¹

DISCUSSION

The current study takes additional Knowledge to develop the understanding of the extent to which the 1987 ACR and the 2010 ACR/EULAR criteria for RA can identify the same patients with early arthritis. In the present study out of 290 subjects, seven RA patients agreed by both diagnostic tests. In addition, both tests agreed that there were 216 subjects who showed negative. Showed slight agreement between diagnostic tests. However, a study by Fautrel *et al.* (2011) observed that at baseline, 579 (71.4%) patients satisfied the 1987 ACR criteria for RA and 641 (79.0%) the 2010 ACR/EULAR criteria; 526 patients satisfied both criteria and 168 patients were measured discordant, only 115 satisfying the 2010 criteria and 53 the 1987 criteria,²² In addition, At 2 years Six hundred and eleven patients met both criteria and 89 were considered discordant: 51 satisfied only the 1987 criteria and 38 only the 2010 criteria. Concordance between the two sets was moderate to good: the κ coefficient was 0.45 (95% CI 0.38 to 0.52) at baseline and 0.42 (95% CI 0.33 to 0.51). The 2010 ACR/EULAR criteria identified more RA patients in ESPOIR than did the 1987 ACR criteria-79% versus 71.4%, which is consistent with recently published studies.²³⁻²⁵

Another study by kasturi *et al.* (2014) observed that ninety-eight (77 %) participants were classified as RA by reviewers consensus opinion; 98 (77 %) fulfilled 1987 criteria, while 79 (63 %) fulfilled 2010 criteria. Seventy-two (56 %) were classified as RA by both sets, 21 (16 %) by neither, 26 (20 %) by only 1987 criteria, and 9 (7 %) by only 2010 criteria. Kappa for concordance was 0.36 (95 % CI 0.20-0.53). Whereas according to Zhao *et al.* (2013) Inter-rater analysis between ACR/EULAR 2010 and ACR 1987 showed that agreement of the two criteria was substantial (Kappa=0.744, P<0.001).²⁶

CONCLUSION

In conclusion, with the use of the 2010 ACR/EULAR criteria, more patients were recognized as having RA than with the use

of the 1987 ACR criteria. The ACR/EULAR criteria performed considerably better than the 1987 ACR criteria for predicting a diagnosis of RA this highlights the inevitable and constant risk of patient misclassification.²⁷

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References

1. Symmons D, Turner G, Webb R, *et al.* 2002. The prevalence of rheumatoid arthritis in the United Kingdom: new estimates for a new century. *Rheumatology (Oxford)*. 41:793-800.
2. Goekoop-Ruiterman YP, de Vries-Bouwstra JK, Allaart CF, *et al.* 2007. Comparison of treatment strategies in early rheumatoid arthritis: a randomized trial. *Ann Intern Med.* 146:406-15.
3. Fautrel B, Combe B *et al.* 2011. Level of agreement of the 1987 ACR and 2010 ACR/EULAR rheumatoid arthritis classification criteria: an analysis based on ESPOIR cohort data Clinical and epidemiological research. *annrheumdis*. 200:259.
4. Saraux A, Berthelot JM, Chalès G, *et al.* 2001. Ability of the American College of Rheumatology 1987 criteria to predict rheumatoid arthritis in patients with early arthritis and classification of these patients two years later. *Arthritis Rheum.* 44: 2485- 91.
5. Aletaha D, Neogi T, Silman AJ, *et al.* 2010 Rheumatoid arthritis classification criteria: an American College of Rheumatology/European League Against Rheumatism collaborative initiative. *Ann Rheum Dis.* 69 : 1580 - 8
6. Jennifer H Humphreys, Suzanne M M Verstappen, Kimme L Hyrich, Jacqueline R Chipping, Tarnya Marshall, Deborah P M Symmons. 2013. The incidence of rheumatoid arthritis in the UK: comparisons using the 2010 ACR/EULAR classification criteria and the 1987 ACR classification criteria. Results from the Norfolk Arthritis Register. *Clinical and epidemiological research Ann Rheum Dis.* 72:1315-1320.
7. Arnett FC, Edworthy SM, Bloch DA, *et al.* 1998. The American Rheumatism Association 1987 revised criteria for the classification of rheumatoid arthritis. *Arthritis Rheum* 1988.31:315-24
8. Harrison BJ, Symmons DP, Barrett EM, *et al.* 1998. The performance of the 1987 ARA classification criteria for rheumatoid arthritis in a population based cohort of patients with early inflammatory polyarthritis. *American Rheumatism Association. J Rheumatol.* 25:2324-30.
9. Hülsemann JL, Zeidler H. 1999. Diagnostic evaluation of classification criteria for rheumatoid arthritis and reactive arthritis in an early synovitis outpatient clinic. *Ann Rheum Dis.* 58:278-80.
10. Saraux A, Berthelot JM, Chalès G, *et al.* 2001. Ability of the American College of Rheumatology 1987 criteria to predict rheumatoid arthritis in patients with early arthritis and classification of these patients 2 years later. *Arthritis Rheum.* 44:2485-91.
11. Liao KP, Batra KL, Chibnik L, *et al.* 2008. Anti-cyclic citrullinated peptide revised criteria for the classification of rheumatoid arthritis. *Ann Rheum Dis.* 67:1557-61.
12. Aletaha D, Neogi T, Silman AJ, *et al.* 2010. The 2010 rheumatoid arthritis classification criteria: an American College of Rheumatology/European League against Rheumatism collaborative initiative. *Ann Rheum Dis.* 69:1580-8.
13. Arnett FC, Edworthy SM, Bloch DA, *et al.* 1988. The American Rheumatism Association 1987 revised criteria for the classification of rheumatoid arthritis. *Arthritis Rheum.* 31:315-24.
14. Aletaha D, Neogi T, Silman AJ, *et al.* 2010 rheumatoid arthritis classification criteria: an American College of Rheumatology/European league against Rheumatism collaborative initiative. *Ann Rheum Dis* 2010.69:1580-8.
15. Anthony J. Viera, MD; Joanne M. Garrett. 2005. PhD. Understanding Interobserver Agreement: Family Medicine, Research Series. 37 (5):360-363
16. Britsemmer K, Ursum J, Gerritsen M, van Tuyl L, van Schaardenburg D. 2011. Validation of the 2010 ACR/EULAR classification criteria for rheumatoid arthritis: slight improvement over the 1987 ACR criteria. *Ann Rheum Dis.* 70:1468-1470.
17. Bykerk VP, Jamal S, Boire G, Hitchon CA, Haraoui B, Pope JE. 2012. The Canadian Early Arthritis Cohort (CATCH): patients with new-onset synovitis meeting the 2010 ACR/EULAR classification criteria but not the 1987 ACR classification criteria present with less severe disease activity. *J Rheumatol.* 39:3071-3080.
18. Cader MZ, Filer A, Hazlehurst J, de Pablo P, Buckley CD, Raza K. 2011. Performance of the 2010 ACR/EULAR criteria for rheumatoid arthritis: comparison with 1987 ACR criteria in a very early synovitis cohort. *Ann Rheum Dis.* 70:949-955.
19. Fautrel B, Combe B, Rincheval N, Dougados M. 2012. Level of agreement of the 1987 and 2010 ACR/EULAR rheumatoid arthritis classification criteria: an analysis based on ESPOIR cohort data. *Ann Rheum Dis.* 71:386-389.
20. Kaneko Y, Kuwana M, Kameda H, Takeuchi T. 2011. Sensitivity and specificity of 2010 rheumatoid arthritis classification criteria. *Rheumatology.* 50:1268-1274.
21. Van der Linden MP, Knevel R, Huizinga TW, van der Helm-van Mil AH. 2011. Classification of rheumatoid arthritis: comparison of the 1987 American College of Rheumatology criteria and the 2010 American College of Rheumatology/European League Against Rheumatism criteria. *Arthritis Rheum.* 63:37-42.
22. Fautrel B, Verstappen SM, Boonen A. 2011. Economic consequences and potential benefits. *Best Pract Res Clin Rheumatol.* 25: 607-24.
23. Britsemmer K, Ursum J, Gerritsen M, van Tuyl LH, van Schaardenburg D. 2011. Validation of the 2010 ACR/EULAR classification criteria for rheumatoid arthritis: slight improvement over the 1987 ACR criteria *Ann Rheum Dis.* 70(8):1468-70.
24. Cader MZ1, Filer A, Hazlehurst J, de Pablo P, Buckley CD, Raza k. 2011. Performance of the 2010 ACR/EULAR criteria for rheumatoid arthritis:

- comparison with 1987 ACR criteria in a very early synovitis cohort. *Ann Rheum Dis.* 70(6):949-55.
25. Van der Linden MP1, Knevel R, Huizinga TW, van der Helm-van Mil AH. 2011. Classification of rheumatoid arthritis: comparison of the 1987 American College of Rheumatology criteria and the 2010 American College of Rheumatology/European League Against Rheumatism criteria. *Arthritis Rheum.* 63(1):37-42.
26. Kasturi S, Goldstein BL, Malspeis S, Karlson EW, Costenbader KH. Comparison of the 1987 American College of Rheumatology and the 2010 American College of Rheumatology/ European League against Rheumatism criteria for classification of rheumatoid arthritis in the Nurses' Health Study cohorts. *Rheumatol Int.* 2014. 34(3):407-11.
27. Zeidler H. 2011. How can misclassification be prevented when using the 2010 American College of Rheumatology/European League Against Rheumatism rheumatoid arthritis classification criteria? Comment on the article by van der Linden *et al.* *Arthritis Rheum.* 63: 2544-6.

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