Quality of life in children with atopic dermatitis: A one-year prospective cohort study

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Abstract

Background: Literature on the quality of life trends across time in children with atopic dermatitis are scarce.

Aims: To assess factors associated with quality of life of children with atopic dermatitis after a one-year follow-up and to examine the factors contributing to greater improvement in the atopic dermatitis-related quality of life over one year.

Methods: Our cohort consisted of 98 children who were treated for atopic dermatitis at the clinic of dermatovenereology. Data collection included atopic dermatitis scoring using the SCORing Atopic Dermatitis (SCORAD) index, Children's Dermatology Life Quality Index (CDLQI) for children aged > four years and Infants' Dermatitis Quality of Life Index (IDLQI) for children aged 0–4 years. Categorization of the impairment of quality of life score due to atopic dermatitis was as follows: mild (score from 0 to 6), moderate (score from 7 to 12) and severe (score from 13 to 30). The cohort was followed for one year after which a total of 80 children were reassessed.

Results: Improvements of both CDLQI and IDLQI were observed in children whose impairment of quality of life due to atopic dermatitis after one year was 'mild'. This was not observed in children whose atopic dermatitis caused either 'moderate' or 'severe impairment' of their quality of life. Adjusted analysis showed that lower initial SCORAD and greater improvement in SCORAD after the one-year follow-up were associated with a better quality of life at follow-up.

Limitations: The size of our cohort was relatively small. Study participants were recruited from the largest urban and medical referral center in Serbia. Persons from suburban or rural regions may have had different perceptions of atopic dermatitis-related quality of life.

Conclusion: Children with less severe atopic dermatitis were more likely to improve their atopic dermatitis-related quality of life. Lower SCORAD was associated with both better quality of life initially and greater improvement in quality of life after one year of follow-up.

Key words: Atopic dermatitis, children, quality of life

Introduction

Atopic dermatitis is common in children and young adults. Due to the chronic nature of atopic dermatitis and its interference with daily functioning, quality of life of both younger and older children can be impaired.[1] The impairment of quality of life in children with atopic dermatitis varies from mild to extremely severe.[2] Existing evidence suggests that poor quality of life in children contributes to unfavorable atopic dermatitis-related outcomes such as poor compliance with medical treatment, fear of corticosteroids, insufficient knowledge about atopic dermatitis and use of other medicines, such as complementary and alternative therapies.[3] Therefore, long-term follow-up of atopic dermatitis in children is essential. The primary objective of this study was to assess

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factors associated with quality of life in children affected by atopic dermatitis at one year of follow-up. The secondary objective was to examine the difference between quality of life at baseline and after one year of follow-up as well as the factors contributing to greater improvement of atopic dermatitis-related quality of life over the period of one year.

Methods

Participants

From January 2014 to June 2015, a total of 98 children and their parents were recruited at the Clinic of Dermatovenereology, Clinical Center of Serbia in the capital city of Belgrade. The sample size was calculated using the Raosoft sample size calculator,[4] based on a margin of error of 5%, confidence interval of 95%, population size of children aged 0–18 years residing in Belgrade (300,000 individuals) and the worldwide prevalence of atopic dermatitis in children aged 0–18 years (response distribution) of 7%.[5] The calculated sample size was 100.

Inclusion criteria were a confirmed diagnosis of atopic dermatitis, absence of other skin diseases and parental fluency in the spoken and written Serbian language. The diagnosis of atopic dermatitis was based on the Hanifin and Rajka criteria.[6] Depending on the clinical presentation, all children were treated with emollient creams, topical mid-potency corticosteroids (mometasone furoate, fluocinolone acetonide or betamethasone dipropionate) and oral second-generation non-sedating antihistamines (desloratadine or levocetirizine). All children were treated with emollient creams, topical mid-potency corticosteroids (mometasone furoate, fluocinolone acetonide or betamethasone dipropionate) and oral second-generation nonsedating antihistamines (desloratadine or levocetirizine).

This study was approved by the Ethics Committee of the Faculty of Medicine, University of Belgrade (Approval no. 29/XII-21). All parents provided signed informed consent.

Data collection

Sociodemographic data were collected by a general questionnaire. Data on children's atopic dermatitis were obtained from the health records to minimize potential information bias. The majority of children with atopic dermatitis (more than 80%) came along with both parents. Hence, we were not able to specify parental gender in the analysis of demographic characteristics.

Children older than 87 years were evaluated using the Children's Dermatology Life Quality Index (CDLQI).[7] For children aged less than 87 years, the Infants' Dermatitis Quality of Life Index (IDLQI) was used.[8] We used the versions of questionnaires in Serbian language (internal consistency, as measured by the Cronbach's alpha for CDLQI and IDLQI were 0.73 and 0.88, respectively).[9] The treating dermatologist (VR) conducted the interviews for the children and their parents. The same dermatologist conducted the assessment after one year of follow-up, for consistency of data collection. After physical examination, the children and parents filled the questionnaire independently in an adjacent room connected to the main dermatologist office. The dermatologist investigator was at their disposal at all times for clarifications and explanations if needed. Higher scores indicated a poorer quality of life. The categorization of the impairment of quality of life score due to atopic dermatitis is suggested as follows: 0–1 = no effect, 2–6 = small effect, 7–12 = moderate effect, 13–18 = very large effect and 19–30 = extremely large effect of atopic dermatitis on the child's life.[10]

The severity of atopic dermatitis was assessed by the same dermatologist (VR) at baseline and after 1 year of follow-up using the SCORing Atopic Dermatitis index (SCORAD).[11] Higher SCORAD values indicated higher atopic dermatitis severity. Follow up visits with the dermatologists were carried out every six months. The frequency of visits were more for those with increased disease severity. Longitudinal data analysis reveals that after six months atopic dermatitis is still active in quite a few patients.[12] For this reason, we opted for a one-year period of follow-up to provide opportunities for a meaningful improvement.

Of 98 parent-child dyads, 80 (81.6%) remained in the study cohort at the end of one-year follow-up . All parents were contacted by telephone in order to make an appointment one year after the baseline. However, even after multiple telephone calls we were not able to reach 18 child-parent pairs and had to leave them from the analysis. The remaining 80 parent-child pairs were retested with CDLQI/IDLQI and SCORAD after one year of follow-up (48 children were reassessed with CDLQI and 32 with IDLQI).

Statistical analyses

The change in SCORAD (Δ SCORAD) was calculated by subtraction of the SCORAD score after one year from the SCORAD score at baseline. The calculation of Δ CDLQI/IDLQI was performed in a similar manner. By merging the five categories of CDLQI/IDLQI severity after one year of follow-up, we obtained the following categorization of the quality of life impairment due to atopic dermatitis based on the children's quality of life scores: mild (score from 0 to 6), moderate (score from 7 to 12) and severe impairment (score from 13 to 30).[10] The Wilcoxon test for two paired samples was used to evaluate differences in children's quality of life scores between baseline testing and after 1-year follow-up.

Linear regression models were used to assess factors associated with children's quality of life and greater improvement in the atopic dermatitis-related quality of life after 1 year of follow-up. Univariate associations of baseline sociodemographic and clinical characteristics with CDLQI/IDLQI and Δ CDLQI/IDLQI after 1-year follow-up were examined. All univariately significant and marginally significant variables ($P < 0.250$) were entered into multiple linear models.[13] Data were

analyzed using the Statistical Package for the Social Sciences, version 20 (Chicago, IL, USA).

Results

No significant differences in either demographic or clinical characteristics were observed at baseline between children and the parents in the follow-up cohort and those lost to follow-up.

The average CDQLI and IDQOL scores according to levels of impairment of quality of life due to atopic dermatitis after completion of follow-up are shown in Table 1. Children whose quality of life was "moderately" impaired due to atopic dermatitis at baseline (CDLQI/IDQOL total score in the range 7-12) significantly improved after 1 year. Therefore, after follow-up, the impairment of children's quality of life after follow-up was classified as "mild" (CDLQI/IDQOL total score < 7). Average scores in the other two groups who had "moderate" or "severe" impairment of quality of life due to atopic dermatitis after follow-up were classified as having "severe" impairment" of quality of life due to atopic dermatitis at baseline (CDLQI/IDQOL total score above 12.0)

We observed a significant improvement of both CDLQI and IDLQI scores in children whose impairment of quality of life was "mild" due to atopic dermatitis after follow-up [Table 1]. Changes in quality of life scores were not observed in children whose quality of life was "moderately" or "severely" impaired due to atopic dermatitis after follow-up [Table 1]. In older children whose quality of life was "moderately" impaired due to atopic dermatitis, "going out, playing or doing hobbies" showed improvement after follow-up, while in younger children "problem at mealtimes" worsened [Table 1]. In older children whose quality of life was "severely" impaired due to atopic dermatitis, "being called names, teased, bullied, asked questions or avoided" and disturbance of sleep became worse on follow-up [Table 1].

The multiple linear models in which the dependent variables were CDLQI/IDLQI scores after one year were adjusted

Table 1: Mean values (standard deviation) of the children's dermatology life quality index and infants' dermatitis quality of life index at baseline and after one year of follow-up according to levels of impact of atopic dermatitis on child's life quality after follow-up

Items	Categories of impairment of children's quality of life due to atopic dermatitis after 1 year follow-up								
	Mild impairment (*n*=24)		*P*	Moderate impairment (*n*=24)		*P*	Severe impairment (*n*=32)		*P*
	Baseline	After 1 year		Baseline	After 1 year		Baseline	After 1 year	
CDLQI									
1. Itchy, "scratchy", sore or painful skin	1.7 (0.7)	0.9 (0.2)	**0.002**	2.0 (0.8)	1.8 (0.4)	0.426	2.3 (0.6)	2.5 (0.6)	0.163
2. Embarrassed, self-conscious, upset or sad	1.1 (0.8)	0.4 (0.5)	**0.003**	1.4 (0.8)	1.3 (0.5)	0.583	1.8 (0.7)	2.0 (0.5)	0.331
3. Affected friendships	0.7 (0.7)	0.1 (0.2)	**0.001**	1.1 (1.0)	0.9 (0.5)	0.426	1.3 (0.8)	1.4 (0.7)	0.454
4. Change or wearing of different or special clothes/shoes	0.8 (0.7)	0.4 (0.5)	**0.048**	1.0 (0.8)	0.7 (0.5)	0.165	1.5 (0.7)	1.5 (0.7)	1.000
5. Going out, playing or doing hobbies	0.8 (0.5)	0.1 (0.3)	**0.001**	1.2 (1.0)	0.6 (0.5)	**0.040**	1.4 (0.8)	1.7 (0.8)	0.137
6. Avoidance of swimming or other sports	0.8 (0.7)	0.2 (0.4)	**0.003**	1.1 (1.0)	0.6 (0.6)	0.137	1.5 (0.9)	1.7 (0.9)	0.381
7. Affected school work/holiday	0.9 (0.8)	0.1 (0.3)	**0.001**	1.1 (1.1)	1.3 (0.6)	0.640	1.7 (0.9)	2.0 (0.9)	0.413
8. Being called names, teased, bullied, asked questions or avoided	0.4 (0.6)	0.0 (0.0)	**0.014**	0.6 (0.9)	0.2 (0.4)	0.111	0.7 (0.6)	1.2 (0.7)	**0.004**
9. Affected sleep	1.2 (0.7)	0.5 (0.5)	**0.003**	1.6 (1.0)	1.2 (0.4)	0.239	2.0 (0.8)	2.4 (0.5)	**0.049**
10. Problem with the treatment	1.1 (0.7)	0.4 (0.5)	**0.007**	1.5 (1.0)	1.1 (0.3)	0.266	1.8 (0.6)	2.1 (0.5)	0.111
Total CDLQI score	9.7 (5.1)	3.2 (1.8)	**0.001**	12.8 (8.2)	9.7 (1.7)	0.197	15.9 (5.8)	18.6 (5.0)	0.066
IDQOL									
1. Itching and scratching	2.1 (0.6)	1.1 (0.6)	**0.004**	2.0 (0.7)	2.1 (0.3)	0.673	2.1 (0.7)	2.1 (0.4)	0.317
2. Mood	1.1 (0.7)	0.6 (0.5)	**0.034**	1.5 (0.9)	1.3 (0.6)	0.273	1.3 (0.9)	2.0 (0.8)	0.182
3. Time to get to sleep	0.6 (0.8)	0.1 (0.3)	0.052	0.8 (0.8)	0.8 (0.6)	0.721	0.7 (0.7)	1.2 (0.5)	0.102
4. Disturbed sleep	0.5 (1.0)	0.0 (0.0)	0.138	0.5 (0.8)	0.4 (0.6)	0.673	1.0 (1.0)	1.1 (0.7)	0.604
5. Impaired playing	0.8 (0.9)	0.1 (0.3)	**0.023**	1.0 (0.8)	0.6 (0.5)	0.111	0.7 (0.5)	1.1 (0.5)	0.078
6. Interference with family activities	1.1 (0.9)	0.2 (0.4)	**0.024**	1.3 (0.7)	0.5 (0.5)	0.190	1.0 (0.6)	1.4 (0.5)	0.077
7. Problem at mealtimes	0.8 (1.0)	0.1 (0.3)	0.066	1.0 (0.7)	1.1 (0.5)	**0.046**	0.4 (0.5)	1.0 (0.6)	0.414
8. Problems caused by the treatment	1.1 (1.0)	0.5 (0.5)	**0.039**	1.0 (0.7)	0.5 (0.5)	0.776	0.8 (0.9)	1.4 (0.5)	0.366
9. Uncomfortable dressing and undressing	0.8 (0.9)	0.2 (0.4)	0.081	1.1 (0.8)	0.9 (0.5)	1.000	1.3 (0.7)	1.8 (0.4)	0.279
10. Problem at bathtime	0.7 (1.2)	0.0 (0.0)	0.111	0.8 (0.9)	0.8 (0.4)	0.794	1.0 (0.8)	1.3 (0.7)	0.705
Total IDQOL score	9.6 (7.9)	2.9 (1.6)	**0.012**	11.1 (5.9)	9.5 (1.7)	0.250	10.4 (5.4)	15.3 (2.5)	0.154

Answers were graded on a 4-point scale from 0 to 3 where higher values indicated the more severe effect of atopic dermatitis (CDLQI/IDQOL score range 0-30). The impairment to children's quality of life due to atopic dermatitis was assessed using the following total CDLQI/IDQOL score cutoffs after follow-up: 0-6 mild impairment; 7-12 moderate impairment; ≥13 severe impairment of quality of life due to atopic dermatitis; *P* values indicating statistically significant changes are in bold. CDLQI: children's dermatology life quality index, IDQOL: infants' dermatitis quality of life index, AD: atopic dermatitis

for age, atopic dermatitis duration, SCORAD at baseline and Δ SCORAD, family history of atopic dermatitis and having asthma. This model showed that lower SCORAD at baseline and greater improvement of SCORAD after one year were associated with a better quality of life of children after follow-up [Table 2].

The multiple linear models in which the dependent variables were Δ CDLQI/IDLQI scores were adjusted for SCORAD at baseline, Δ SCORAD over follow-up and having allergic rhinitis. The model showed that greater improvement of SCORAD over follow-up was associated with greater atopic dermatitis-related quality of life improvement. This association remained stable after additional adjustment for the child's age and gender and duration of atopic dermatitis [Table 3].

Discussion

This study found that children with less impaired quality of life due to atopic dermatitis tend to improve their quality of life after one year. Children who had "moderately" or "severely" impaired quality of life due to atopic dermatitis were not likely to improve over the period of follow-up .More severe skin changes at baseline and less improvement in skin changes over time were consistently associated with poorer quality of life in children with atopic dermatitis, regardless of the covariates across regression models.

Our findings suggest that children with less extensive atopic dermatitis have a greater potential to improve their disease and daily functioning. Reduction in skin changes was reflected in favorable physical and mental health changes in everyday functioning of both younger and older children. The persistent greater impairment of quality of life among children could be potentially due to different intrinsic and environment-related factors. Future studies should focus on measurements of immune response, changes in microbiome or environmental allergens.

Table 2: Linear regression analysis of factors associated with children's quality of life as measured by the children's dermatology life quality index and infants' dermatitis quality of life index after one year of follow-up

Independent variables	Univariate linear regression		Multiple linear regression	
	Beta coefficient (95% CI)	*P*	Beta coefficient (95% CI)	*P*
Child's age (years)	0.30 (0.02-0.59)	0.038	0.27 (-0.03-0.34)	0.075
Child's gender (Male versus Female)	0.41 (-2.59-3.40)	0.788		
Duration of AD (years)	0.40 (0.10-0.70)	0.009	-0.01 (-0.30-0.30)	0.994
Family history of AD (Yes versus no)	2.77 (-0.26-5.80)	0.073	1.41 (-0.27-3.08)	0.098
Having asthma (Yes versus no)	2.71 (-0.73-6.14)	0.212	0.10 (-2.03-2.23)	0.924
Having allergic rhinitis (Yes versus no)	-0.72 (-4.88-3.43)	0.729		
SCORAD at baseline	0.10 (0.01-0.19)	0.047	0.36 (0.29-0.43)	0.001
ΔSCORAD	-0.18 (-0.25-−0.11)	0.001	-0.36 (-0.42−0.31)	0.001
Parental age (years)	0.08 (0.18-0.35)	0.525		
Parental level of education	-0.06 (-1.60-1.49)	0.942		
Number of children in the family	-0.06 (-2.10-1.97)	0.949		

ΔSCORAD: SCORAD at baseline - SCORAD after 1 year of follow-up, CI: confidence interval, AD: atopic dermatitis, SCORAD: scoring AD index

Table 3: Linear regression analysis of factors associated with greater improvement in children's atopic dermatitis - related quality of life as measured by the Δ Children's dermatology life quality index/infants dermatitis quality of life index after one year of follow-up

Independent variables	Univariate linear regression		Multiple linear regression		Multiple linear regression additionally adjusted for child's age, gender and duration of AD	
	Beta coefficient (95% CI)	*P*	Beta coefficient (95% CI)	*P*	Beta coefficient (95% CI)	*P*
Child's age (years)	-0.02 (-0.35-0.31)	0.909			0.10 (-0.17-0.36)	0.469
Child's gender						
Male versus Female	-0.06 (-3.50-3.37)	0.970			-0.78 (-2.28-0.72)	0.303
Duration of AD (years)	-0.15 (-0.51-0.20)	0.383			-0.08 (-0.35-0.20)	0.585
Family history of AD (Yes versus no)	-1.27 (-4.79-2.24)	0.472				
Having asthma (Yes versus no)	0.65 (-3.33-4.62)	0.747				
Having allergic rhinitis (Yes versus no)	4.10 (-0.54-8.74)	0.083	0.88 (-1.07-2.83)	0.371	0.65 (-1.42-2.72)	0.531
SCORAD at baseline	0.28 (0.19-0.37)	0.001	0.01 (-0.05-0.06)	0.973	0.01 (-0.05-0.06)	0.865
ΔSCORAD	0.38 (0.34-0.42)	0.001	0.37 (0.33-0.42)	0.001	0.37 (0.32-0.42)	0.001
Parental age (years)	-0.05 (-0.35-0.25)	0.744				
Parental level of education	-0.19 (-1.97-1.58)	0.827				
Number of children in the family	0.19 (-2.11-2.50)	0.867				

ΔSCORAD: SCORAD at baseline - SCORAD after 1 year of follow-up, CI: confidence interval, AD: atopic dermatitis, SCORAD: scoring AD index

Previous studies found that having more severe atopic dermatitis was associated with poorer quality of life of children[14,15] and their families.[16] The results of our study are in line with the previous evidence. In fact, we observed that both more severe atopic dermatitis as measured by the SCORAD at baseline and a lesser degree of improvement in SCORAD after one year independently contributed to poorer quality of life after one year among children in our cohort. A long-term study of atopic dermatitis in children in the United States reported that higher atopic dermatitis activity at the beginning of follow-up was associated with more likelihood of uncontrolled i.e., persistent atopic dermatitis.[17] The improvement of SCORAD after one-year follow-up has consistently been associated with better atopic dermatitis-related quality of life in children in our cohort. Therefore, treatment for each child with atopic dermatitis should be personalized according to severity and initiated as early as possible to facilitate favorable outcomes.[18]

Several limitations need to be considered. Since both parents filled the questionnaires together, we were not able to include one single gender as a parental demographic characteristic. The size of our cohort was relatively small, given the retention rate of slightly over 80% after one year of follow-up. Furthermore, specific therapeutic modalities for atopic dermatitis and the number of medications used in atopic dermatitis treatment were not analyzed in this study. Instead, we applied SCORAD to describe the disease severity. Study participants were recruited from the largest urban and medical referral center in Serbia and persons residing in suburban or rural regions may have had different perceptions of atopic dermatitis-related quality of life. Other factors such as secondhand smoke exposure, having pets, duration of exclusive breastfeeding and use of daycare services which were not included in this analysis, could have introduced residual confounding.

Conclusion

Children with less severe atopic dermatitis are more likely to significantly improve with respect to their atopic dermatitis-related quality of life. Positive changes in quality of life after one year were not observed in children whose quality of life was moderately or severely impaired due to atopic dermatitis after one year.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

References

1. Yang EJ, Sekhon S, Sanchez IM, Beck KM, Bhutani T. Recent developments in atopic dermatitis. Pediatrics 2018;142 pii: E20181102.
2. Reed B, Blaiss MS. The burden of atopic dermatitis. Allergy Asthma Proc 2018;39:406-10.
3. Sokolova A, Smith SD. Factors contributing to poor treatment outcomes in childhood atopic dermatitis. Australas J Dermatol 2015;56:252-7.
4. Raosoft Sample Size Calculator. Available from: http://www.raosoft.com/samplesize.html. [Last accessed on 2019 Nov 10].
5. Pols DH, Wartna JB, van Alphen EI, Moed H, Rasenberg N, Bindels PJ, *et al*. Interrelationships between atopic disorders in Children: A meta-analysis based on ISAAC Questionnaires. PLoS One 2015;10:e0131869.
6. Hanifin J, Rajka G. Diagnostic features of atopic dermatitis. Acta Derm Venereol Suppl (Stockh) 1980;92:44-7.
7. Lewis-Jones MS, Finlay AY. The Children's Dermatology Life Quality Index (CDLQI): Initial validation and practical use. Br J Dermatol 1995;132:942-9.
8. Lewis-Jones MS, Finlay AY, Dykes PJ. The infants' dermatitis quality of life index. Br J Dermatol 2001;144:104-10.
9. Ražnatović Djurović M, Janković J, Tomić Spirić V, Janković S. Health-related quality of life in children with moderate to severe atopic dermatitis. Acta Dermatovenerol Croat 2015;23:178-84.
10. Waters A, Sandhu D, Beattie P, Ezughah F, Lewis-Jones S. Severity stratification of Children's Dermatology Life Quality Index (CDLQI) scores. Br J Dermatol 2010;163 Suppl 1:121.
11. Oranje AP, Glazenburg EJ, Wolkerstorfer A, de Waard-van der Spek FB. Practical issues on interpretation of scoring atopic dermatitis: The SCORAD index, objective SCORAD and the three-item severity score. Br J Dermatol 2007;157:645-8.
12. Abuabara K, Margolis DJ, Langan SM. The Long-Term Course of Atopic Dermatitis. Dermatol Clin 2017;35:291-7.
13. Kirkwood BR, Sterne JAC. Essential Medical Statistics. 2nd Ed. Blackwell Publishing; 2003. p. 341.
14. Ben-Gashir MA, Seed PT, Hay RJ. Predictors of atopic dermatitis severity over time. J Am Acad Dermatol 2004;50:349-56.
15. Monti F, Agostini F, Gobbi F, Neri E, Schianchi S, Arcangeli F. Quality of life measures in Italian children with atopic dermatitis and their families. Ital J Pediatr 2011;37:59.
16. Chernyshov PV, Jirakova A, Ho RC, Moed H, Caldeira AP, Alvarenga TM, *et al*. An international multicenter study on quality of life and family quality of life in children with atopic dermatitis. Indian J Dermatol Venereol Leprol 2013;79:52-8.
17. Margolis JS, Abuabara K, Bilker W, Hoffstad O, Margolis DJ. Persistence of mild to moderate atopic dermatitis. JAMA Dermatol 2014;150:593-600.
18. Huang A, Cho C, Leung DY, Brar K. Atopic dermatitis: Early treatment in children. Curr Treat Options Allergy 2017;4:355-69.