

Development and validation of a questionnaire to evaluate the Quality of Life of cats with skin disease and their owners, and its use in 185 cats with skin disease

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Background – Skin disease can negatively affect the Quality of Life (QoL) of cats and of their owners.

Objectives – To develop and evaluate a questionnaire on QoL of cats with skin disease and their owners.

Methods – Following interviews with owners of cats with severe skin disease and elaboration of a preliminary 19 item questionnaire, a final 15 item (score 0–3) questionnaire was developed. This was administered to owners of 45 cats with allergic dermatitis and 39 healthy cats, to assess its ability to differentiate between diseased and healthy subjects. In allergic cats, owners evaluated overall disease severity (S) and pruritus with a Visual Analog Scale (VAS); veterinarians evaluated skin lesions [SCORing Feline Allergic Dermatitis (SCORFAD) and Feline Dermatitis Extent and Severity Index (FeDESI)]. The correlation with QoL was analysed by Spearman's rank test. In 31 allergic cats, SCORFAD, FeDESI, pruritus VAS, S and QoL scores were obtained before and after therapy, and their improvement evaluated statistically.

Results – QoL scores in allergic cats were significantly higher than in healthy cats ($P < 0.0001$). Severity correlated well and significantly with both cat's and owner's QoL ($r = 0.51$ and 0.64 , $P = 0.0003$ and < 0.0001 , respectively). Correlation of QoL with pruritus VAS was moderate and significant ($r = 0.3$, $P = 0.03$), whereas with SCORFAD and FeDESI it was low and not significant. With therapy all scores decreased significantly ($P < 0.0001$); however, QoL was not influenced by improvement of clinical scores. Questions related to the burden of therapy showed the smallest improvements.

Conclusions – This QoL questionnaire could be a useful tool in evaluating cats with skin disease.

Introduction

Diseases affecting the skin and/or ears are commonly seen among cats.¹ Some, such as coat density changes or nonsymptomatic alopecic patches due to dermatophytosis, can be of little or no disturbance to the cats, but others are associated with high level pruritus, pain and discomfort, as seen for example in severe cases of head and neck pruritus or in plasma cell pododermatitis. Manipulations due to therapy administration, alimentary changes, physical constraints due to Elizabethan collars or bandages, visits to veterinary clinics and consequent consultations can be highly disturbing to feline patients, too. Furthermore, the material and psychological consequences of taking care of a cat with skin disease, such as increased expenditure, change of habits, administration of medications, as well as feelings of sorrow, guilt and disgust can also negatively impact on an owners' life. It is

thus clear that the condition and its treatment can decrease the quality of life of cats with skin disease and the quality of life of their owners.

"Quality of life" (QoL) generally is defined as "the degree to which an individual enjoys his or her life". In the human medical field, the term "health-related quality of life" is defined as "the specific effect of a disease on the individual's well-being". In veterinary medicine, QoL has been defined as "the level of an individual's satisfaction (needs and desires) that are determined by the individual's living conditions, which then determine factors such as health, happiness and longevity".²

Questionnaires have been developed in human and veterinary medicine to assess the general wellbeing of people or animals. Several have been published and validated in canine medicine, and have been object of an evidence-based review.³ Two of these deal with the evaluation of QoL of dogs affected with skin disease and that of their owners.^{4–6}

In feline medicine, there are only a few studies dealing with QoL assessments in general or related to specific diseases, such as degenerative joint disease, cardiopathies, diabetes mellitus, cancer and chemotherapy for lymphoma.^{7–13} To the best of the authors' knowledge,

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there is no published study about a questionnaire validated for the assessment of the impact of skin disease on the QoL of cats and their owners. Such a questionnaire would be helpful in clinical trials for the evaluation of the efficacy of therapeutic interventions for skin diseases, as well as a guideline for the choice of treatment protocols, which should be able to improve not only the clinical signs, but also the general wellbeing of cats and their owners.

This study aimed to develop and validate a questionnaire capable of objectively assessing the QoL of cats with skin disease and that of their owners, following the methodology previously described for dogs.^{4,5} A further aim was to evaluate the QoL of cats affected with different dermatological conditions and that of their owners, and its correlation with the presence of pruritus. As for the canine version, in the validation process the questionnaire was administered to owners of healthy cats and cats with allergic dermatitis, before and after treatment. Our hypothesis was that QoL indices would be significantly different between healthy and allergic cats, that those of allergic cats would correlate with pruritus and clinical severity scores, and that they would improve after therapy.

Materials and methods

Study sample

Study participants were the owners of cats with cutaneous disease presented for dermatological examination to different referral practices in Northern Italy and owners of healthy cats presented for routine vaccination in the same practices. In cats with allergic dermatitis, the diagnosis was made using currently accepted criteria and by exclusion of other pruritic diseases.¹⁴ Only one owner answered the questionnaire for each cat. Owners whose cats had systemic or severe illnesses, other than the dermatological problem, which could have impaired the owner's QoL and that of their pets, were excluded from the study. In cats affected by allergic dermatitis, clinical scores were assessed by the validated SCORing Feline Allergic Dermatitis (SCORFAD) and the unvalidated Feline Dermatitis Extent and Severity Index (FeDESI) scales; pruritus was evaluated by the owners by means of a descriptive Visual Analog Scale (VAS), adopted from canine studies.^{15–18}

Individual qualitative interviews

Detailed preliminary interviews were conducted with owners of cats affected by severe dermatological diseases, usually suffering from pruritus and/or pain, skin lesions, exudation, alopecia and ulceration. These interviews were free and owners were encouraged to describe in which way their cat's disease was disturbing their QoL and that of their pets. The answers were all transcribed and analysed in order to identify the components of the owners' and cats' lives most affected by the disease.

Pilot questionnaire

Following the model of the Dermatology Life Quality Index, a questionnaire developed in human medicine based on simple questions with four possible answers, a pilot questionnaire was developed, aiming at assessing the impact of the disease on all areas of the cats', owners' and families' lives emerging from the individual qualitative interviews.¹⁹ The answers were scored: 0 (not at all), 1 (a little), 2 (quite a bit) and 3 (very much).

The questionnaire was composed of 19 questions: one question on the perception of the general severity of the disease, nine questions on the QoL of the cat, and nine questions on the QoL of the owners and family. This questionnaire was administered to 16

owners of cats that had various severe skin diseases with the purpose of evaluating if the questions were understandable, clear and relevant, and if they could correctly identify the areas of the owners' and cats' lives affected by the skin disease. Questions with an item-total correlation < 0.30 and with a low positive response rate were removed.

Evaluation of the final questionnaire 1 – comparison of healthy and diseased cats

A final 15 item questionnaire (Appendix S1) was administered to owners of cats with allergic dermatitis and to owners of healthy cats. Results of questions 2–8 (QoL of cats) and 9–15 (QoL of owners) were added together and sums were called QoL1 and QoL2, respectively. Internal consistency of considered groups of items was assessed by calculating Cronbach alpha. Scores of questionnaires answered by owners of healthy and diseased cats were evaluated for statistical difference by Student's *t* test.

Evaluation of the final questionnaire 2 – correlation with clinical signs

Criterion-related validity was assessed in allergic cats by calculating the correlation of QoL1 and QoL2 scores with SCORFAD, FeDESI and pruritus VAS scores, by means of Spearman's rank-order correlation coefficient test.

Evaluation of the final questionnaire 3 – correlation of owner-perceived severity to the QoL of cats and owners

Construct validity was assessed by evaluating the correlation of the owner-perceived general severity (question 1) with QoL1 and QoL2 by means of Spearman's rank-order correlation coefficient test. Severity was also correlated with SCORFAD, FeDESI and pruritus VAS scores.

Evaluation of responsiveness to therapy

The questionnaire was administered to owners of cats with allergic dermatitis before and after a therapeutic intervention. It was decided in advance to repeat the test only if the cat was judged to be improved. The same owner was asked to repeat the questionnaire and the same investigator performed the pre-and post-treatment clinical examinations. Improvement of median severity score S, QoL1 and QoL2 were determined by the Wilcoxon signed rank test. Improvement of mean SCORFAD, FeDESI and VAS pruritus scores were determined by paired samples Student's *t* test. The improvement of SCORFAD and FeDESI and the VAS pruritus scores after therapy, with QoL1 and QoL2, respectively, was evaluated by linear regression.

Data analysis: diseases

Mean QoL1 and QoL2 and total QoL1 + QoL2 scores were determined for diseases diagnosed in three or more cats. Scores of pruritic diseases were compared to those of nonpruritic diseases by means of the Kruskal–Wallis test.

Statistical analysis

All statistical analysis was performed with SAS 9.2 (SAS Institute inc.; Cary, NC, USA).

Results

Individual qualitative interviews

Fourteen detailed qualitative interviews were conducted in the period October 2011 to March 2012. The answers of the owners who participated in these interviews were all transcribed and summarized in a final document, whose analysis came to the following conclusions:

- 1 The main areas of the cat's life which could be disturbed by the disease were:
 - a Disturbance of sleep
 - b Disturbance of meals (no appetite, grooms during meals, does not like special food)
 - c Behavioural changes (lethargic, anxious, aggressive, nervous, hides away, is reserved)
 - d Disturbance of play (lazier, more nervous, does not play, lacks curiosity, does not explore anymore)
 - e Change of daily routines (the cat is not allowed on the owner's bed, has to eat special food)
 - f Disturbance caused by therapies (injections, shampoos, pills)
 - g Disturbance caused by the consultations at the veterinary clinic (travel, visit, physical examination, injections)
- 2 The main areas of the owners' life which could be disturbed by their cat's disease were:
 - a Practical problems (more cleaning, cooking), time loss, exhaustion
 - b Psychological aspects (guilt, powerlessness, cosmetic problem, sorrow, regret, anxiety, nuisance, anger, frustration, resignation, fear of zoonosis)
 - c Disturbance in the relationship with their cat (due to the cat's mood changes or due to skin lesions and feeling of dirtiness)
 - d Financial problems
 - e Practical and psychological problems (stress, anxiety) related to the administration of the therapies

Pilot questionnaire

Sixteen owners of cats with severe skin disease completed the pilot questionnaire with 19 questions and gave comments on it. All owners declared that all questions were clear and understandable. Seven of nine questions on the quality of life of the cats were considered very important and received high scoring. These included questions on behavioural changes, disturbances of sleep, feeding, play, relationship to owners, change of habits and nuisance of therapies. Two questions were eliminated: the first was a duplication of another question on the cat-owner relationship and the second dealt with the cat's relationship towards other animals which obtained very few positive answers. Of the nine questions on the QoL of the owners, two were considered less relevant and obtained low scores: these were questions on disturbance due to physical uneasiness (offending odour, feeling of dirtiness at home, aesthetic nuisance) and on disturbance of personal relationships among family members.

Seven questions were considered important and received high scores. These included questions on increase of time loss, physical exhaustion, disturbance of family activities, increase of family expenses, psychological distress, problems with administration of therapies and the owner-cat relationship. After removal of four questions with an item-total correlation <0.30 or with a low response rate, a definitive questionnaire composed of 15 questions was produced (Appendix S1).

Evaluation of the final questionnaire – animals

The final 15 item questionnaire was given to 45 owners of cats with allergic dermatitis and 39 owners of healthy cats. Owners of healthy cats were not requested to answer the first question on the severity of the disease. In the 45 allergic cats SCORFAD, FeDESI and pruritus VAS were also assessed. In 37 of 45 allergic cats the QoL questionnaire was administered also after therapy; in 31 of them SCORFAD, FeDESI and pruritus VAS were also evaluated after treatment.

Evaluation of the final questionnaire 1 – comparison of healthy and diseased cats

In allergic cats, scores for the QoL1 scale (0–21) ranged from 1 to 21 (median 9, mean 9.7, SD 5.1), scores for the QoL2 scale (0–21) ranged from 1 to 20 (median 10, mean 10.5, SD 4.8). There was a minimum ceiling effect (i.e. maximum score 21 was reached only in 1 of 45 subjects [2.5%] for QoL1 and 0 of 45 for QoL2) and no floor effects (no subject scored 0 for QoL1 or for QoL2). In healthy cats scores for the QoL1 scale (0–21) ranged from 0 to 11 (median 2, mean 2.9, SD 2.6), scores for the QoL2 scale (0–21) ranged from 0 to 12 (median 6, mean 5.3, SD 3.2). QoL1 and QoL2 scores were significantly higher in allergic cats compared to healthy controls ($P = <0.0001$). There was internal consistency between QoL1 and QoL2 in allergic cats ($\alpha = 0.92$) and inter-item correlation was high (0.86) and significant ($P < 0.0001$).

Questionnaires for 37 of the abovementioned 45 cats were analysed in more detail. In these cats, using the mean score for individual questions (range 0–3), the most highly scoring items in QoL1 were (in decreasing order): behavioural changes, visits to the veterinarian, administration of therapies and disturbance of playing activities/interaction with environment. The most highly scoring items of QoL2 were emotional distress, expenditure and administration of therapies (Table 1). Using the percentage of owners (out of 37) responding positively to each of the questions, the most commonly reported QoL1 aspects were (in decreasing order): impact on behaviour, visits to the veterinarian and administration of therapies, whereas the most commonly reported QoL2 aspects were (in decreasing order): concerns on expenditure, exhaustion, emotional distress and time loss.

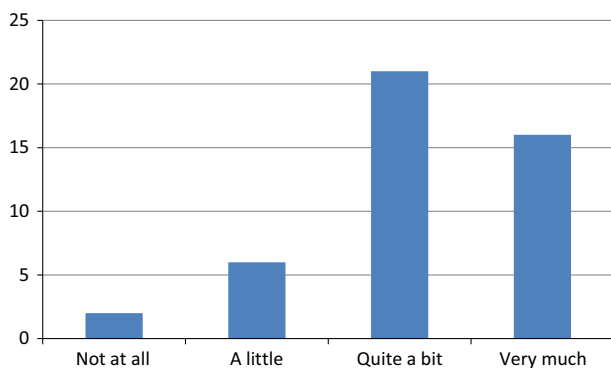
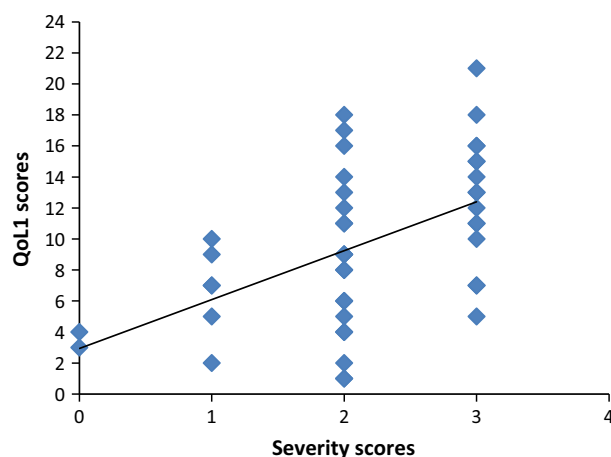
Evaluation of the final questionnaire 2 – correlation to clinical signs

The VAS for pruritus, SCORFAD and FeDESI were determined in 45 allergic cats. The SCORFAD scores (possible scores 0–16) ranged from 0 to 12 (median 5, mean 5.3, SD 2.3), FeDESI scores (possible scores 0–630) ranged from 1 to 105 (median 20, mean 26.5, SD 21.5) and the VAS (range 0–10) scores ranged from 1.9 to 10 (median 6.9, mean 6.9, SD 1.8). Correlations between QoL and clinical scores are reported in Table 2. Both QoL scores showed a moderate and significant correlation to pruritus but not to lesional scores.

Table 1. Evaluation of a Quality of Life questionnaire for cats with allergic skin disease

Question number/Number of responders	Not at all (score 0)	A little (score 1)	Quite a bit (score 2)	Very much (score 3)	Total scores	Mean	Median (range)	% of positive answers
1 – severity	2	6	15	14	78	2.12	2 (1–3)	94.6
QoL 1 (cat)								
2 – behaviour/mood	3	10	2	12	70	2.10	2(0–3)	91.9
3 – sleep	12	13	7	5	42	1.89	1(0–3)	67.6
4 – meals	13	12	6	6	42	1.13	1(0–3)	64.9
5 – playing/exploring	10	2	9	6	48	1.29	1(0–3)	73.0
6 – change of habits	11	12	9	5	45	1.21	1(0–3)	70.3
7 – therapies	6	11	11	9	60	1.62	2(0–3)	83.8
8 – visits to the vet	3	7	17	10	71	1.91	2(0–3)	91.9
QoL2 (owner)								
9 – time loss	5	12	15	5	57	1.54	2(0–3)	86.5
10 – exhaustion	4	5	13	5	56	1.51	1(0–3)	89.2
11 – family activities	11	10	11	5	47	1.27	1(0–3)	70.3
12 – expenditure	1	10	19	7	69	1.86	2(0–3)	97.3
13 – emotional distress	4	6	17	10	70	1.89	2(0–3)	89.2
14 – administration of therapy	8	7	15	7	58	1.56	2(0–3)	78.4
15 –relationship with cat	13	10	7	7	45	1.21	1(0–3)	64.9

Number of responders, for each score, total and mean score, percentage of responders for each question ($n = 37$).

**Figure 1.** Quality of Life (QoL) questionnaires in allergic cats: distribution of scores to Question 1 (owner-perceived disease severity) in 45 allergic cats. The y-axis shows the number of respondents for each answer option.**Figure 2.** Quality of Life (QoL) questionnaires in allergic cats: correlation of owner-perceived severity (Question 1) with QoL1 (questions 2–8) in allergic cats ($n = 45$).**Table 2.** Correlation between Quality of Life (QoL) and clinical scores in 45 cats with allergic dermatitis (*significant at $P < 0.05$)

	Correlation	
	r	P
QoL1 $\times$ SCORFAD	0.28	0.06
QoL2 $\times$ SCORFAD	0.20	0.19
QoL1 $\times$ FeDESI	0.17	0.26
QoL2 $\times$ FeDESI	0.19	0.22
QoL1 $\times$ VAS pruritus	0.32	0.03*
QoL2 $\times$ VAS pruritus	0.33	0.03*

SCORFAD, SCORing feline allergic dermatitis; FeDESI, feline dermatitis extent and severity index; VAS, Visual Analog Scale.

Evaluation of the final questionnaire 3 – correlation of owner-perceived severity to the QoL for allergic cats and their owners, and to SCORFAD, FeDESI and pruritus

Owner perceived general severity (question 1) of the disease of 45 allergic cats (possible range 0–3) ranged from 0 to 3 (median 2, mean 2.1, SD 0.8) (Figure 1). All owners but two answered positively to this question. The correlation of the owner perceived general severity (question 1) and QoL1 was good and significant ($r = 0.51$, $P = 0.0003$) (Figure 2). The correlation of the owner-perceived general severity (question 1) and QoL2 was good and significant ($r = 0.64$, $P < 0.0001$) (Figure 3). The correlation between severity and FeDESI and between severity and SCORFAD were poor and nonsignificant ($r = 0.03$, $P = 0.83$ and $r = 0.05$ and $P = 0.74$, respectively), whereas that of severity and pruritus was moderate and significant ($r = 0.42$, $P = 0.0041$).

Evaluation of responsiveness to therapy

Owner assessed severity (S), QoL-1, QoL-2, SCORFAD, FeDESI and pruritus VAS were determined before and after therapy in 31 of 45 (above mentioned) allergic cats (see Table S1). All scores decreased significantly ($P < 0.0001$) after therapy (Table 3 and Table S1).

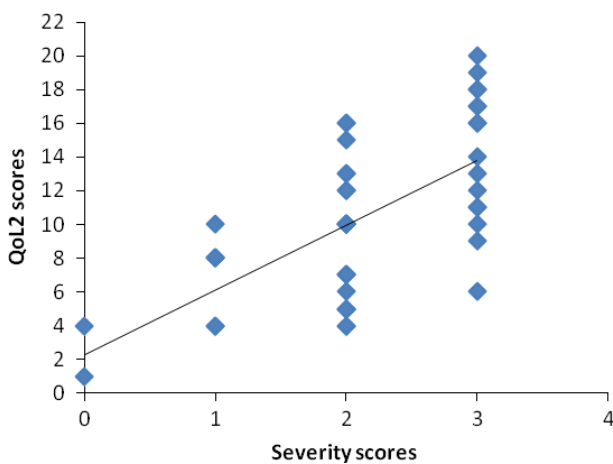


Figure 3. Quality of Life (QoL) questionnaires in allergic cats: correlation of owner-perceived severity (Question 1) with QoL2 (questions 9–15) in allergic cats ($n = 45$).

Percentage mean improvements were 61.9% for severity (S), 58.3% for QoL-1, 41.3% for QoL2, 86.0% for SCORFAD, 94% for FeDESI and 78.0% for pruritus VAS.

Although correlation of S with QoL1 and QoL2 was high and significant in pre-treatment questionnaires (QoL1: $r = 0.55$ and $P = 0.001$; QoL2: $r = 0.62$ and $P = 0.0002$), in post-treatment data, S had a high and significant correlation with QoL1 ($r = 0.44$ and $P = 0.012$),

but not with QoL2 ($r = 0.28$ and $P = 0.12$). Post-treatment QoL1 and QoL2 scores were not influenced by improvement in SCORFAD or FeDESI ($P > 0.4$ for all combinations). Although there was no influence of pruritus on QoL2 ($P = 0.8$), there was on QoL1 ($\beta = -0.57$ and $P = 0.01$; thus, a reduction of 1 cm pruritus score was associated with an average QoL2 reduction of 0.6 points).

The answers to the single questions were compared before and after treatment in 37 of 45 (above mentioned) allergic cats. All questions showed a decrease in scores albeit of differing magnitude (Table 4). Of the QoL of cats (QoL1), all aspects of the cat's life improved consistently with therapy, with the exception of the disturbance associated with administering treatment and the visits to the veterinarian (questions 7 and 8, respectively). Of the QoL of owners (QoL2), areas directly dependent on the cats' treatment (time loss, expenditure and administration of treatments) improved less than items dealing with the relationship with the pet and emotional distress due to its skin condition. A similar trend was apparent when percentages of positive answers (scores 1–3) were considered (Table 4).

Data analysis: diseases

The questionnaire was administered to 185 owners of cats with skin disease presented for dermatological examination. Primary diagnoses and their prevalence are

Table 3. Comparison of pre- and post-treatment means of owner-assessed severity (S), Quality of Life of cats (QoL1) and owners (QoL2), SCORFAD, FeDESI and pruritus VAS in 31 cats with allergic dermatitis

	Data analysed	Before	After	Test used	P value
Severity	Median	2	1	Wilcoxon signed rank test	<0.0001
QoL1	Median	9	3	Wilcoxon signed rank test	<0.0001
QoL2	Median	10	5	Wilcoxon signed rank test	<0.0001
SCORing feline allergic dermatitis (SCORFAD)	Mean $\pm$ SD	5.8 $\pm$ 2.3	0.8 $\pm$ 1.1	Paired samples Student's <i>t</i> test	<0.0001
Feline dermatitis extent and severity index (FeDESI)	Mean $\pm$ SD	29.6 $\pm$ 24.3	1.7 $\pm$ 2.7	Paired samples Student's <i>t</i> test	<0.0001
Pruritus Visual Analog Scale (VAS)	Mean $\pm$ SD	6.8 $\pm$ 1.8	1.4 $\pm$ 1.9	Paired samples Student's <i>t</i> test	<0.0001

Table 4. Mean Quality of Life (QoL) scores and percentage of positive answers for each question before and after treatment and their percentage of improvement for QoL1 and QoL2 for 37 cats with allergic dermatitis

		Mean score			Percentage of positive answers		
Question no.	QoL category	Before	After	Percentage improvement	Before	After	Percentage decrease positive answers
QoL1							
2	Behaviour/mood	1.9	0.5	74	92	32	60
3	Sleep	1.1	0.2	82	68	16	52
4	Meals	1.1	0.5	55	65	27	38
5	Playing/exploring	1.3	0.4	77	73	8	65
6	Change of habits	1.2	0.5	58	70	35	35
7	Therapies	1.6	1.1	31	84	84	0
8	Visit to veterinarian	1.9	1.6	16	92	95	−3
QoL2							
9	Time loss	1.5	1.0	33	87	89	−2
10	Exhaustion	1.5	0.8	47	89	68	18
11	Family activities	1.3	0.9	31	70	65	15
12	Expenditure	1.9	1.2	37	97	81	16
13	Emotional distress	1.9	1.1	58	89	65	24
14	Therapy administration	1.6	1.0	38	78	68	10
15	Relationship with cat	1.2	0.4	67	65	24	41

Table 5. Results of a Quality of Life (QoL) questionnaire administered to the owners of 185 cats with skin disease.

Diagnosis	N = 185	Mean score S (range 0–3)	Mean score QoL1 (range 0–21)	Mean score QoL2 (range 0–21)	Total score QoL1 + QoL2 (range 0–42)
Allergic dermatitis	63	1.9	8.8	9.7	18.5
Allergic reactions to food	19	2.0	9.1	9.5	18.5
Flea bite allergy	14	1.6	8.6	8.6	17.2
Dermatophytosis	13	1.7	6.8	11.5	18.2
Eosinophilic granuloma	10	2.0	9.9	8.8	18.7
Idiopathic neck lesion	10	2.3	12.5	12.6	25.2
Chin acne	7	1.0	7.9	10.0	17.9
Otoacariasis	6	2.7	14.8	14.2	29.0
Insect bite hypersensitivity	6	1.5	6.8	7.5	14.3
Pemphigus foliaceus	5	2.4	10.6	13.8	24.4
Persian dirty face disease	4	2.8	10.8	9.8	20.5
Herpes virus infection	4	1.7	7.3	7.3	14.7
Plasmacell pododermatitis	4	2.0	5.5	6.3	11.8
Actinic keratosis	3	2.3	11.7	11.7	23.3
Lip ulcer	3	1.0	6.0	4.7	10.7
Pediculosis	3	1.3	7.0	7.7	14.7
Mast cell tumour	2	1.0	2.5	8.5	11.0
Squamous cell carcinoma <i>in situ</i>	1	1.0	13.0	12.0	25.0
Pinnal condritis	1	3.0	14.0	11.0	25.0
Nasal squamous cell carcinoma	1	3.0	11.0	10.0	21.0
Demodicosis	1	2.0	10.0	16.0	26.0
Lentigo simplex	1	0.0	2.0	3.0	5.0
Psychogenetic alopecia	1	2.0	10.0	8.0	18.0
Drug reaction	1	2.0	18.0	14.0	32.0
Urticaria pigmentosa-like dermatitis	1	3.0	10.0	11.0	21.0
Epitheliotropic lymphoma	1	3.0	20.0	20.0	40.0

S, severity; QoL1, cat's QoL; QoL2, owner's QoL

summarized in Table 5, together with mean severity scores (S), QoL1, QoL2 and total scores (QoL1 + QoL2).

When taking into account the diseases diagnosed in five or more cats, the diagnoses with a higher total score (i.e. a worst QoL), in decreasing order, were: otoacariasis, feline neck lesion, pemphigus foliaceus, eosinophilic granuloma, allergic dermatitis, adverse reaction to food, dermatophytosis, chin acne, flea bite allergy and insect bite allergy (Table 5).

The group of pruritic diseases included allergic dermatitis, flea-allergy dermatitis, adverse reaction to food, otodectic mange, mosquito-bite hypersensitivity, herpes virus infection, idiopathic neck lesion and all forms of otitis. Nonpruritic diseases included all forms of noninflammatory alopecia, chin acne, actinic keratosis, dermatophytosis, pemphigus foliaceus, plasma cell pododermatitis and lip ulcer. Compared to nonpruritic diseases, pruritic diseases did not give significantly higher results for S ($P = 0.3$), QoL1 ($P = 0.3$) or QoL2 ($P = 0.7$).

Discussion

In this study we developed and validated a questionnaire for the evaluation of the QoL of cats with skin disease and that of their owners. QoL scores in allergic cats were significantly higher than those of healthy cats; disease severity correlated well and significantly with both cat's and owner's QoL, although correlation with pruritus was moderate and that with skin lesions was low and not significant. With therapy, pruritus, lesions and QoL scores improved significantly. QoL was not influenced by improvement of the clinical scores and questions related

to the burden of therapy showed the smallest improvements. Evaluation of the QoL of 185 cats with skin disease and their owners detected the dermatological conditions most frequently associated with a low QoL in affected cats and owners.

The development of this questionnaire closely mirrored that of the canine version which followed methodologies published in the human field. The number of qualitative interviews necessary to identify those aspects of life negatively affected by the illness was smaller in cats than in dogs, reflecting either a simpler lifestyle or relationship to the owners.^{4,5} Seven areas of the cat's life were identified which could be disturbed by the skin disease. These were similar to those identified in studies on the impact of degenerative joint and heart disease in cats.^{8,10} Two aspects considered important by these studies and not identified in ours were grooming activities and appropriate use of the litter box, possibly because the former is often overexpressed in cats with dermatitis and the latter is usually normal. Areas of cats' lives disturbed by skin disease identified in this study were slightly different to those described for dogs, such travels to veterinary clinics and medical consultations being considered more disturbing for cats than dogs.⁵

In relation to the owners' QoL, when compared with canine studies, skin diseases of cats were not considered to cause great disturbance to normal family life, interpersonal relationships with family members or external social relationships, whereas it appeared that practical and psychological problems related to the administration of the medications and fear of zoonoses could negatively impact on the owners' QoL. The difficulty in administering

medications and particularly the stress related to clinic visits previously were considered to negatively impact the QoL of feline patients with heart disease.¹⁰ In that study, although about half of owners found it easy to administer medications to their cats, about one third found it difficult or extremely difficult and about one fifth considered it negatively affecting their cat's QoL, with the level of concern increasing as the number of medications and dosing frequencies increased.¹⁰ Furthermore, about two thirds of the owners perceived a high or very high level of stress of their cat before and during a hospital visit.¹⁰ The authors concluded that medications and clinic visits could be perceived by some owners as detrimental to the QoL of their cats and that the administration of drugs and their potential benefit always should be discussed with them, to identify the best treatment option for their pets.

As for the canine version,⁴ the questionnaire presented herein was administered to owners of healthy and of diseased cats, and was able to discriminate between the two populations. Likewise, the test was administered to owners of allergic cats before and after therapy, and a significant improvement in QoL scores was observed. Both of these evaluations are important in the validation process of a QoL questionnaire, particularly for the assessment of criterion validity, in the absence of other QoL assessment tools or of a gold standard. Using known groups is a straightforward way of overcoming this limit, by determining whether the instrument can clearly distinguish between normal and affected animals, or by using a known effective treatment to determine whether there is a change in "before and after" scores. To the best of the authors' knowledge there is no published report on feline QoL assessment comparing healthy and diseased cats, or of cats before and after treatment.

Individual cats' QoL1 questionnaire items in allergic cats that presented with the highest scores and number of positive answers were: behavioural changes, visit to the veterinarian, administration of therapies, and disturbance of playing activities and interaction with the environment. Interestingly, in dogs the ranking of these items was slightly different, with impact on dog's activities following behavioural changes and preceding the disturbance of drug administration (the item "visit to the veterinarian" was not included in the canine questionnaire).⁴ Again, this confirms that the disturbance due to treatments is more important in cats than in dogs. Likewise, cats' owners' QoL2 items that presented the highest scores were: emotional distress, expenditure and stress associated with the administration of therapies. Interestingly, the latter item had a high mean score but not the highest number of positive answers, suggesting that not all owners have difficulties with the administration of medications, but when these are present they are important, as previously reported.¹⁰ Ranking of QoL2 items with the highest scores and number of positive answers was slightly different in dogs, with expenditure being the most important one.⁴ This difference could be due to the greater physical dimension of dogs versus cats, influencing the cost of therapies.

Treatment was associated with relatively greater improvement in clinical signs than changes in QoL

scores, and QoL1 more than QoL2. These results are similar to observations in dogs.^{5,20} This could be due to the burden, particularly for the owner, of administering the therapies necessary to improve the clinical lesions, not always improving the cat's and the owner's QoL. In fact, as in dogs⁵, when evaluating the single questionnaire items, the areas in which improvement was less apparent were those associated with treatment, such as the administration of medications, visits to the veterinarian, expenditure and time loss. Similar to the canine questionnaire, in particular for some items (disturbance due to therapies/visits to the hospital and owners' time loss), there was no decrease in the number of positive answers, indicating that the disturbance was still present – albeit of a smaller magnitude. From our results it is thus evident that factors related to disease treatment greatly influence, in cats more than in dogs, the perception of the QoL of pets and owners. Should an owner perceive a negative impact on the QoL of animal or owner due to the therapy, he or she could decide to withdraw it, even in spite of improvement of clinical signs. It is very important to recognize this because it may influence the decision about which treatment protocol to prescribe.

It is also interesting to note that in the post-treatment questionnaire, scores for QoL1, but not QoL2, were significantly associated with the improvement of pruritus and correlated significantly with disease severity, suggesting a direct effect of the disease on the cat's and not on the owner's wellbeing.

Criterion validity was assessed by comparing QoL with clinical scores. In order to be able to perform such a comparison, a skin disease with a validated severity scoring system needed to be chosen. Among dermatological conditions, allergic dermatitis is one of the most frequently diagnosed in cats and is characterized by the presence of pruritus and development of skin lesions, such as self-induced alopecia, excoriations and plaques (eosinophilic plaques).^{1,14} On the one hand, as for dogs with allergic disease, objective scoring tools have been described to evaluate the severity of skin lesions in feline allergic dermatitis, such as the FeDESI and the SCORFAD.^{15–17} Of these, only the latter was validated, although in a comparative study the former was considered to correlate better with pruritus.²¹ On the other hand, no tool for the evaluation of pruritus has been developed specifically for cats and investigators usually adopt the canine VAS for cats.¹⁸

In this study QoL scores showed a moderate and significant correlation with pruritus, but did not correlate with FeDESI or to SCORFAD. These results are comparable to those observed in dogs, confirming that pruritus, but not the presence of skin lesions, is able to influence QoL in cats with skin disease.⁴ This can be particularly true in cats where extensive skin lesions may include self-inflicted, noninflammatory alopecia; such lesions do not impair, *per se*, any aspect of the cat's life. In our cases, SCORFAD, FeDESI and pruritus VAS provided information on the severity of the skin disease, whereas the QoL questionnaire described how skin disease was affecting the cats' and the owners' wellbeing. It could well be that two cats with similar lesional scores have greatly different QoL, depending on the type of lesions and on the influence of the disease and/or of the therapy

on their mood, meals, sleep, habits, playing activities, and interactions with owners and other animals. This observation confirms the importance of including the evaluation of QoL, and not just clinical signs, when conducting studies for the assessment of the efficacy of therapeutic interventions for dermatological conditions. In fact, in human medicine measurement of QoL commonly is used in research studies to complement clinical evaluations and is now considered to be, in conjunction with mortality rate, one of the standard primary endpoints in clinical trials.²²

The QoL scores for 185 cats with different dermatological conditions and those of their owners were evaluated in this study. Similar to observations in dogs and humans, a highly pruritic mite infestation, such as otodectic mange, albeit quickly and easily treated, was associated with the worst QoL scores.^{5,23} Other diseases associated with high QoL scores in cats, as in dogs, were allergies and pemphigus foliaceus. Similar to the canine study, even if QoL scores were positively and significantly correlated to pruritus VAS scores, pruritic diseases did not present significantly higher QoL scores compared to nonpruritic diseases, confirming the observation that there are other factors, besides pruritus, that can influence the perception of QoL in cats and their owners.⁵

One limitation of this study was that repeatability was not assessed. This was not considered necessary because, given that the feline questionnaire was very similar to the canine one, it was presumed to give similar (good) results.⁴ Another limitation, that unfortunately was identified after the conclusion of the study, was that question 1 ("How severe and disturbing is your cat's disease?") can be taken to be asking two separate things, severity and disturbance, which may not necessarily be the same, and some owners may have found it confusing or hard to answer. For the future it is thus proposed to change the first question to "How severe is your cat's disease?", for the assessment of disease severity only, leaving the assessment of disturbance to the other items in the questionnaire.

In conclusion, we have developed and validated a simple 15 item questionnaire for the evaluation of the impact of skin disease on the QoL of cats and their owners. This tool is able to differentiate healthy from diseased cats and is sensitive to improvement following therapeutic interventions. However, it measures different parameters than just clinical signs and should be administered in parallel with clinical evaluation tools when assessing the efficacy of therapeutic interventions for dermatological disorders in cats. Due to the stress associated with treatment administration and visits to the veterinarian in cats, QoL assessment would be particularly important in skin diseases needing a long-lasting, complicated or invasive therapy regimen.

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Résumé

Contexte – Les atteintes cutanées peuvent affecter négativement la qualité de vie (QoL) des chats et de leurs propriétaires.

Objectifs – Développer et évaluer un questionnaire de QoL des chats avec dermatoses et de leurs propriétaires.

Méthodes – A la suite d'interviews de propriétaires de chats atteints de dermatoses sévères et l'élaboration d'un questionnaire préliminaire de 19 points, un questionnaire final de 15 points (score 0-3) a été développé. Il a été soumis aux propriétaires de 45 chats avec dermatites allergiques et 39 chats sains, afin de déterminer sa capacité à différencier les sujets malades et sains. Chez les chats allergiques, les propriétaires ont évalué la sévérité globale des lésions cutanées (S) et le prurit à l'aide d'une échelle visuelle analogue (SCORFAD) et le FeDESI (Feline Dermatitis Extent and Severity Index). La corrélation avec la QoL a été analysée par test de rang de Spearman. Pour 31 chats allergiques, les scores de SCORFAD, FeDESI, VAS, S et QoL ont été obtenus avant et après traitement et leur amélioration a été évaluée statistiquement.

Résultats – Les scores de QoL chez les chats allergiques étaient significativement plus élevés que chez les chats sains ($P < 0.0001$). La sévérité corrélait bien et significativement à la fois pour les QoL des chats et de leurs propriétaires ($r = 0.51$ et 0.64 , $P = 0.0003$ et < 0.0001 , respectivement). La corrélation de QoL avec la VAS était modérée et significative ($r = 0.3$, $P = 0.03$), tandis qu'avec SCORFAD et FeDESI c'était faible et non significatif. Avec le traitement tous les scores ont diminué significativement ($P < 0.0001$); cependant, la QoL n'était pas influencée par l'amélioration des scores cliniques. Les questions liées à la lourdeur du traitement montraient les plus faibles améliorations.

Conclusions – Ce questionnaire de QoL pourrait être un outil utile pour l'évaluation des chats atteints de troubles cutanés.

Resumen

Introducción – las enfermedades de la piel pueden afectar negativamente la calidad de vida (QoL) de gatos y sus propietarios.

Objetivos – desarrollar y evaluar un cuestionario de calidad de vida de gatos con enfermedades de la piel y sus propietarios.

Métodos – tras realizar entrevistas con propietarios de gatos con enfermedades de la piel severas y tras elaborar un cuestionario preliminar con 19 preguntas, se desarrolló un cuestionario final con 15 preguntas (puntuación de 0-3). Éste se preguntó a los propietarios de 45 gatos con dermatitis alérgica y a 39 de gatos sanos, para evaluar la capacidad del cuestionario para diferenciar entre animales enfermos y sanos. En gatos alérgicos, los propietarios evaluaron la severidad de la enfermedad global (S) y el prurito con una escala visual análoga (VAS); los veterinarios valoraron las lesiones de la piel (SCORing Dermatitis Alérgica Felina (SCORFAD) e Índice de Extensión y Severidad de Dermatitis Felina (FeDESI). La correlación con la calidad de vida fue analizada mediante una prueba de rangos de Spearman. En 31 gatos alérgicos, SCORFAD, FeDESI, el prurito valorado con VAS, S y QoL se obtuvieron antes y después del tratamiento y su mejora fue evaluada estadísticamente.

Resultados – los valores de QoL en gatos alérgicos fueron significativamente mayores que en gatos sanos ($P < 0.0001$). La severidad se correlacionó bien y significativamente con la QoL de ambos gato y propietario ($r = 0.51$ y 0.64 , $P = 0.0003$ y < 0.0001 , respectivamente). La correlación de la QoL con el prurito valorado con VAS fue moderada y significativa ($r = 0.3$, $P = 0.03$), mientras con los valores de SCORFAD y FeDESI fue baja y no significativa. Con el tratamiento todos los valores disminuyeron significativamente ($P < 0.0001$); sin embargo, la calidad de vida no estuvo influenciada por la mejora en los valores clínicos. Las cuestiones relacionadas con la incomodidad de la terapia presentaron las menores mejoras.

Conclusión e importancia clínica – este cuestionario de QoL puede ser una herramienta útil en la evaluación de gatos con enfermedad de la piel.

Zusammenfassung

Hintergrund – Eine Hauterkrankung kann die Lebensqualität (QoL) von Katzen und ihren BesitzerInnen negativ beeinflussen.

Supporting Information

Additional Supporting Information may be found in the online version of this article.

Table S1. Owner-assessed severity (S), Quality of Life of cats (QoL1) and owners (QoL2), SCORFAD, FeDESI and pruritus VAS results before (pre) and after (post) therapy in 31 cats with allergic dermatitis

Appendix S1. ("Annex 1").

Ziele – Die Entwicklung und Evaluierung eines Fragebogens über die QoL von Katzen mit Hauterkrankungen und ihrer BesitzerInnen.

Methoden – Als Folge von Interviews mit BesitzerInnen von Katzen mit schweren Hauterkrankungen und Ausarbeitung eines vorläufigen Fragebogens mit 19 Punkten, wurde letztendlich ein Fragebogen mit 15 Punkten (Wert 0-3) entwickelt. Dieser wurde BesitzerInnen von 45 Katzen mit allergischer Dermatitis und 39 gesunden Katzen gegeben, um die Unterscheidungsfähigkeit des Tests zwischen erkrankten und gesunden Tieren zu erfassen. Bei allergischen Katzen beurteilten die BesitzerInnen die Schwere der Krankheit insgesamt (S) und den Juckreiz mittels Visual Analog Scale (VAS); TierärztInnen beurteilten die Hautveränderungen [SCORing Feline Allergic Dermatitis (SCORFAD) und Feline Dermatitis Extent and Severity Index (FeDESI)]. Die Korrelation der QoL wurde mittels Spearmans Rangkorrelationskoeffizient analysiert. Bei 31 allergischen Katzen wurden SCORFAD, FeDESI, Juckreiz VAS, S und QoL Werte vor und nach einer Therapie erhoben und ihre Verbesserung statistisch ausgewertet.

Ergebnisse – QoL Werte der allergischen Katzen waren signifikant höher als die von gesunden Katzen ($P < 0,0001$). Der Schweregrad korrelierte gut und signifikant sowohl bei der QoL der Katzen wie auch jener der BesitzerInnen ($r = 0,51$ bzw. $0,64$, $P = 0,0003$ bzw. $< 0,0001$). Die Korrelation von QoL mit dem Juckreiz VAS war moderat und signifikant ($r = 0,3$, $P = 0,03$), während die Korrelation mit SCORFAD und FeDESI niedrig und nicht signifikant war. Mit einer Behandlung erniedrigten sich alle Werte signifikant ($P < 0,0001$); die QoL war jedoch durch die Verbesserungen der klinischen Werte nicht beeinflusst. Fragen, die sich auf die Belastung durch die Therapie bezogen, zeigten die geringsten Verbesserungen.

Schlussfolgerungen – Dieser QoL Fragebogen könnte einen nützlichen Bestandteil bei der Evaluierung von Hauterkrankungen bei Katzen darstellen.

要約

背景 – 皮膚疾患は、ネコおよびその飼い主の生活の質(QoL)に悪影響を与える可能性がある。

目的 – 皮膚疾患のあるネコおよび飼い主のQoLに関する質問を作成し、評価すること。

方法 – 重度の皮膚疾患をもつネコの飼い主への聞き取り調査に続いて、予備的な19項目の詳細な質問を作成し、最終的に15項目(スコア0-3)の質問を作成した。疾患ネコと健康なネコを区別するための能力を評価するために、45頭のアレルギー性皮膚炎のネコの飼い主と39頭の健康なネコの飼い主に聞き取りを実施した。アレルギーのネコにおいて、飼い主は全体的な疾患重症度(S)およびビジュアルアナログスケール(VAS)でそう痒を評価し、獣医師は皮膚病変をSCORing Feline Allergic Dermatitis (SCORFAD)およびFeline Dermatitis Extent and Severity Index (FeDESI)で評価した。QoLの相関はスピアマンの順位検定によって解析した。31頭のアレルギーのネコにおいて、SCORFAD、FeDESI、pruritis VAS、SおよびQoLスコアを治療前後で入手し、それらの改善を統計的に評価した。

結果 – アレルギーのネコにおけるQoLスコアは健康なネコと比較し有意に高かった($P = < 0,0001$)。重症度はネコと飼い主のQoLの両方によく相関しており、有意であった(それぞれ $r = 0,51$ および $0,64$ 、 $P = 0,0003$ および $< 0,0001$)。そう痒VASとQoLの相関は中程度に有意であった($r = 0,3$ 、 $P = 0,03$)が、一方でSCORFADとFeDESIの相関は低く、有意ではなかった。治療によって、すべてのスコアは有意に減少したが($P < 0,0001$)、QoLは臨床スコアの改善に影響しなかった。治療の負担に関連した質問は最も小さい改善を示した。

結論 – このQoL質問集は皮膚疾患をもつネコの評価において有用なツールとなり得る。

摘要

背景 – 皮膚疾病可能降低猫和其主人的生活质量(QoL)。

目的 – 制定并评估有关皮肤病患猫和其主人生活质量的调查问卷。

方法 – 通过与严重皮肤病患猫主人面谈,详细讨论预设的19道调查题目,最终调查问卷包含15道题目(score 0-3)。45位过敏性皮炎患猫的主人和39位正常猫的主人完成此调查问卷,进而评价其区分疾病和健康受试者的能力。对于过敏性疾病患猫,动物主人调查结果全部为严重(s),同时使用直观类比评分法评价瘙痒(VAS);兽医评估皮肤病变[猫过敏性皮炎分数(SCORFAD)和猫皮炎程度和严重性指数(FeDESI)]。通过斯皮尔曼等级鉴定法分析其与QoL的相关性。31只过敏性疾病患猫的动物主人,在治疗前后分别填写SCORFAD, FeDESI, 瘙痒VAS, S 和QoL分数,统计学上评估改善程度。

结果 – 过敏性疾病患猫的QoL分数明显高于健康猫($P = < 0,0001$)。猫主人的QoL和猫的QoL明显密切相关(分别为 $r = 0,51$ 和 $0,64$, $P = 0,0003$ 和 $< 0,0001$)。QoL与瘙痒VAS中度相关($r = 0,3$, $P = 0,03$),但是与SCORFAD和FeDESI相关性差或无明显相关性。所有分数在治疗后明显降低($P < 0,0001$),然而QoL未因临床分数提高而受影响。治疗负担方面的问题改善最小。

结论 – QoL调查问卷可能是评估猫皮肤病的有效手段。