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Research Article

Movoflex® Soft Chews Can Improve Dogs' Mobility, According to Owners

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Abstract

Movoflex® Soft Chew (Virbac, France) is a supplement for dogs containing five key ingredients of natural origin that are known to be beneficial for joint health and mobility. However, the effectiveness of the full formulation has not been tested yet on dogs' mobility.

After testing the good tolerance of the chew in kennelled dogs, the supplement was given to 53 owners of dogs with mobility issues. They had to give one chew adapted to the dog's body weight per day. Questionnaires were sent regularly (on days 1, 15, 30 and 60) to assess mainly the acceptability of the chew by the dogs and its effectiveness on mobility criteria according to the owners, using different scales: the general perception of the dog's mobility (scored from 0 - very bad, to 10 - very good); the Liverpool osteoarthritis in dogs (LOAD) questionnaire; and the global mobility score based on the abilities of the dog to move around and interact with people, using 8 different criteria. The evolution of the different scores was compared over time using ANOVA and Tukey tests or Friedman and signed-rank tests with Bonferroni adjustment when appropriate. The Chi-square test was used to compare proportions. Statistical significance was set for $p < 0.05$.

The results showed an excellent acceptability of the chews (94% of owners considered their dogs liked the chew and took it easily) and a significant improvement in mobility, whatever the scale used. The score given by the owners for their dog's mobility in general significantly improved as of day 7. The median score for this parameter increased by 40%, with median (Q1 - Q3) scores going from 5 (4.25 - 6) to 7 (6 - 8) on Days 1 and 60, respectively. At the end of the study, 62% of owners considered their dogs improved and 60% considered their dog's mobility was good or very good (versus 24% at the beginning). The median (Q1-Q3) score for the satisfaction level (scored over 10), reached 8 (6 - 9) at the end of the study.

This study shows that owners of dogs with mobility issues can perceive the effectiveness of the supplement on their dog's mobility. Controlled studies with veterinarian assessments are now required to confirm the efficacy of Movoflex® Soft Chews in dogs with mobility issues.

Keywords: *Movoflex Soft Chew; Dog's Mobility; Owner Perception; Acceptability of the Chews; Mobility Scores; LOAD Questionnaire*

Abbreviations

CBPI: Canine Brief Pain Inventory; ESM: Eggshell Membrane; HA: Hyaluronic Acid; LOAD: Liverpool Osteoarthritis in Dogs; OA: osteoarthritis; MW: Molecular Weight

Introduction

Mobility issues, such as osteoarthritis (OA), are common in dogs, especially in those getting older or obese, two known risk factors for such issues [1,2]. Osteoarthritis (also known as degenerative joint disease or osteoarthrosis) is a chronic condition characterized by a structural and functional decline of the synovial joint. It can lead to lameness and pain, impacting the quality of life of the animal and disrupting the human-animal bond. It is present in around 20% of dogs over 1 year of age and the prevalence can reach up to 80% in old and obese dogs [1,2].

Osteoarthritis is a complex disease, involving local tissue damage as well as local and systemic inflammatory responses. There is no cure for OA and the management usually involves a combination of therapies to limit the disease evolution, inflammatory process, and pain to improve the quality of life of the animal. Pharmacological agents like non-steroidal anti-inflammatory drugs are usually prescribed but alternatives to medicines are also considered, such as alternative therapies (like acupuncture), intra-articular agents (with hyaluronan for example), or nutraceutical agents (with glucosamine, chondroitin sulfate or collagen for instance) [3].

Movoflex® Soft Chew (Virbac, France) is a nutritional supplement for dogs with a mix of five key ingredients of natural origin that are known to improve joint health and mobility in dogs. It contains eggshell membrane (ESM), a complex ingredient naturally full of different molecules found in joints, including glucosamine, glycosaminoglycans, elastin, collagen, hyaluronic acid, and other proteins and amino acids (mainly proline, glutamic acid, and glycine) that can help support protein synthesis [4,5]. The eggshell membrane in Movoflex® Soft Chews has proven efficacy in humans [6,7] and dogs [8] with mobility disorders.

The supplement also contains hyaluronic acid (HA) of different molecular weights (MW). Indeed, the action of HA can depend on its MW, with higher MW mostly involved in the lubrication and viscoelasticity of the synovial fluid and resilience of the cartilage, while the lower MW HA could help initiate the restorative processes [9,10].

The other elements in Movoflex® Soft Chews (astaxanthin, *Boswellia serrata* extract and krill meal) have been included for their known effect on oxidative stress and inflammatory processes.

Astaxanthin from *Haematococcus pluvialis* (one of the richest and safest sources of astaxanthin) is a powerful antioxidant [11,12]. The *Boswellia serrata* extract is rich in boswellic acids that are known to modulate inflammatory processes [13,14] and have beneficial effects on joints and mobility, including in dogs [15]. The krill, obtained from a sustainable fishery, is a source of omega-3 fatty acids that come in the form of readily absorbed phospholipids [16]. Krill is effective to improve joint health [17-20] and can also help improve the absorption of astaxanthin [21,22] and HA [23].

Similar formulations of Movoflex® Soft Chews (based on ESM and other key ingredients, Virbac, USA) have demonstrated good tolerance and effectiveness in dogs with mobility disorders [24,25] but the formulation with the five key ingredients described above has never been tested. The tolerance of the supplement was first tested in dogs, using the same protocol as described previously, at one and five times the recommended daily amount of one chew per day, for one month [25]. Similarly to what was found with the other formulation [25], no supplement-related effects were noted either on clinical signs, body weight, blood, or urine parameters.

Aim of the Study

The study described hereafter aimed to evaluate the owner's perception of the effectiveness of the supplement to improve their dog's mobility. The acceptability of the chews by dogs and easiness to give were also assessed.

Materials and Methods

The study was conducted in France. Owners of dogs that were over 4 years old, in good general health but with mobility issues for at least 3 months (according to the owner), and that were not receiving any treatment, food, or other supplements for joint support, were recruited to test the chews for 2 months. To be recruited, dogs had to have problems (even slight) in at least two of these mobility criteria, according to the owner (no veterinarian assessment): difficulty standing after lying down for a rest; difficulty walking; the way of walking (with lameness or not); and difficulty climbing stairs or on furniture.

Fifty-three owners received Movoflex® Soft Chews (Virbac, France) to give to their dogs (1 chew daily; 3 different sizes according to body weight) and completed the study. The supplement was given in unlabelled packaging. Movoflex® Soft Chews exist in 3 sizes: small (for dogs < 15 kg), medium (for dogs weighing 15 - 35 kg) and large (for dogs > 35 kg). The objective was to recruit 40% of large dogs, 40% of medium dogs, and 20% of small dogs.

Assessments of organoleptic properties of the chews (global aspect, size, shape, odor, color) were assessed on day 1. The acceptability of the chew, general perception, appreciation, and effectiveness on mobility were assessed regularly by sending questionnaires to the owners on days 1, 7, 15, 30 and 60.

The mobility assessment was based on several criteria:

- General mobility, rated by the owner from 0 (very bad) to 10 (very good)
- The Liverpool Osteoarthritis in Dogs (LOAD) questionnaire [27,28], a validated scale, including 13 questions that are asked and scored (from 0 to 4) regularly to assess the evolution of the dog's mobility. They refer to Activity level at exercise; General activity levels; Ability to exercise; Keenness to exercise; Frequency of rest during exercise; General demeanor; Stiffness after exercise then rest; Effect of exercise on lameness; Stiffness after rest; Disability caused by lameness; Effect of lameness on the ability to exercise; Effect of weather on lameness; Effect of weather on the ability to exercise [27].

The scores given to each question were summed to obtain the LOAD score (over a maximum of 52) that was compared between time points. A decrease in this score means an improvement in mobility.

- The global mobility score: 8 questions based on the Canine Brief Pain Inventory (CBPI) description of function [27], scored from 0 (very bad) to 10 (very good) to assess the dog's ability to move and interact with people: Ability to stand up after lying down; Ability to walk; Ability to run; Ability to climb stairs (if applicable); Ability to climb in the car, sofa, bed (if applicable); Ability to play; Interaction with familiar people and friends; and Description of the dog's way of walking (stiffness/lameness).

The scores given to each question were summed to obtain a global mobility score (over a maximum of 80) that was compared between time points. An increase in this score means an improvement in mobility.

Statistics

Statistical analysis was performed using the Real Statistics Resource Pack software (Release 7.6; Copyright (2013 - 2021) Charles Zaiontz. www.real-statistics.com, last accessed on 09 August 2022).

The normality of data distribution was assessed with the Shapiro-Wilk test. In case of normal distribution (LOAD and global mobility scores), ANOVA tests with repeated measures were performed followed by Tukey HSD tests. Otherwise (General mobility), non-parametric tests were used (Friedman and Wilcoxon Signed-Rank tests) with Bonferroni correction for multiple comparisons when necessary.

To compare proportions, chi-square tests were used. The threshold for statistical significance was initially set for $\alpha = 0.05$. The data are expressed as mean (SD) or median (Q1 - Q3).

Results

The 53 dogs receiving Movoflex® Soft Chews included 21 (40%), 22 (41%), and 10 (19%) large, medium, or small dogs, respectively. The median (Q1 - Q3) dog's age was 9 (8 - 12) year-old and the median dog's body weight was 26 (17 - 36) kg.

Most recruited dogs (92%) had some difficulty standing after a rest and seemed to show lameness when walking (77%). Around half of the owners described their dogs as having some difficulties walking or climbing and only 36% declared that their dogs had some difficulty moving around. Among them, 45% had talked about these mobility problems with their veterinarian.

All dogs remained in good general health during the study, confirming the good tolerance of the chew.

The chew itself (odor, color, shape, etc.) was well perceived by owners and 94% of owners considered the chew easy to take by the dog. At the end of the study, 94% of owners considered the dog liked the supplement.

To assess the effect of the chews on mobility, the dogs who did not take the chews more than three times between two assessments were removed from the analysis, so that 50/53 (94%) dogs were analyzed.

General mobility

The general mobility of dogs, as rated by their owners, significantly improved as of day 7 ($p < 0.001$; Figure 1A). The median (Q1 - Q3) scores went from 5 (4.25 - 6) to 7 (6 - 8) on days 1 and 60, respectively.

At the end of the study, 60% of owners considered their dog's mobility was good or very good (versus 24% at the beginning, Figure 1B), and 62% considered their dogs improved. This amount was reduced to 58% if all dogs (including those who didn't eat the chews regularly) were taken into consideration.

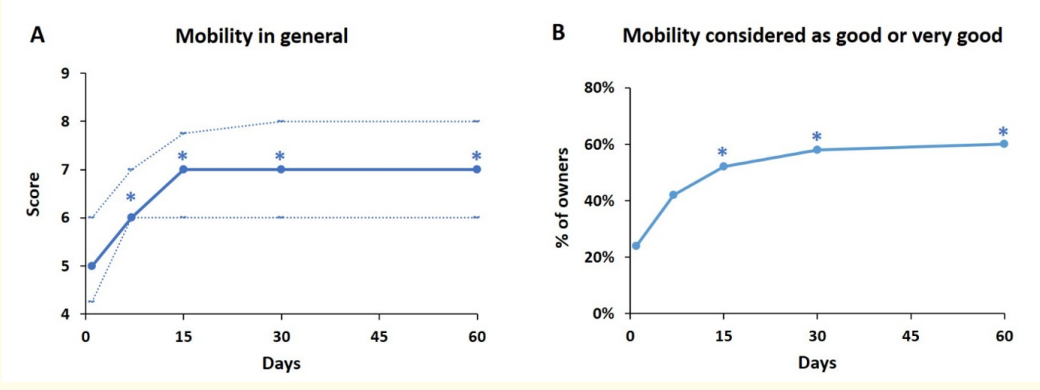

Figure 1: *Overall assessments of the dogs' mobility. (A) Scores given by the owners for their dog's mobility in general, from 0 (very bad) to 10 (very good), on each assessment day. Plain lines: median; thinner dotted lines: first and third quartiles. *: $p < 0.0125$ compared to Day 1 (Wilcoxon Signed rank tests, applying Bonferroni correction). (B) Percentage of owners considering their dog's mobility as good or very good. *$p < 0.0125$, compared to Day 1 (Chi2 test, applying Bonferroni correction).*

LOAD score

The LOAD score also significantly improved (decreased) as of day 15 ($p < 0.01$; Figure 2). The mean (SD) scores went from 23.7 (7.2) to 20.9 (8.0) and 21.5 (8.5) on days 1, 30 and 60, respectively (Figure 2).

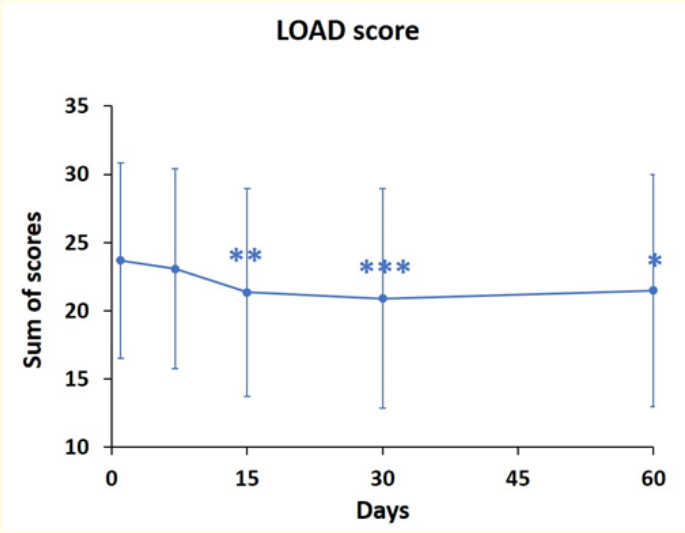

Figure 2: *LOAD score (sum of scores given to 13 questions) obtained on each assessment day. Data are represented as Mean (SD). *: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$, compared to day 1 (One-way RM ANOVA + Tukey HSD tests).*

Global mobility score

The ability of the dog to move around and interact with people was assessed, based on 8 questions, and a global mobility score was obtained.

This score significantly improved (increased) on day 30 ($p < 0.01$; Figure 3).

The criteria that improved the most was the dog's way of walking (lameness) which went from a median (Q1 - Q3) score of 5 (4 - 7) to 6 (5 - 7.75) and 7 (5 - 7) on days 1, 30 and 60, respectively (40% increase on day 60). The other criteria that also significantly improved were the ability to climb on furniture, bed, or car (+ 20% as of day 7; n = 37), the ability to stand up after lying down (+ 17% from day 30, n = 50), and the ability to play (+ 15% on day 30, n = 42).

Global satisfaction

Overall, most owners were satisfied with the supplement tested. When asked to score their satisfaction level between 0 (not satisfied at all) and 10 (very satisfied), the median (Q1-Q3) score was 8 (6 - 9) at the end of the study. After 30 days of use, 74% of owners were ready to buy Movoflex® Soft Chews.

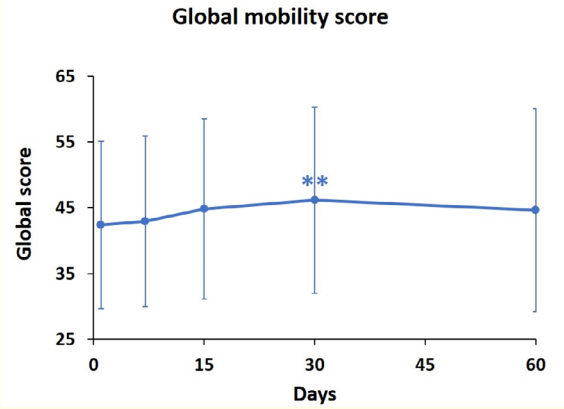

Figure 3: *Global mobility score (sum of scores given to 8 questions) obtained on each assessment day. Data are represented as Mean (SD). **: p < 0.01, compared to Day 1 (One-way RM ANOVA + Tukey HSD tests).*

Discussion

Movoflex® Soft Chews contain a mix of different ingredients of natural origin that are known to be beneficial for joint health and mobility. After showing the good tolerance of the chews in dogs, they were given to owners of dogs with mobility disorders to get their perception of the effectiveness of the chews to improve their dog's mobility.

The results showed that the supplement could significantly improve the dogs' mobility, assessed using either the general owner's perception of their dog's mobility, aggregated scores from the LOAD questionnaire (13 questions), or the global mobility score (based on 8 questions).

When the owners were asked to score their dog's mobility in general, a significant improvement was seen as of day 7 and the median increased by 40% at the end of the study. However, the improvement was significant as of day 15 or day 30 with the LOAD or global mobility scores and the change in score was relatively small (less than 10% improvement).

These differences could be explained by the design itself. The score for the dog's mobility in general is based on this unique question ("how would you rate your dog's mobility in general?") and the answer relates to how the owners perceive their dog's mobility. It highly depends on their interpretation of "dog's mobility", their interaction with the dog, and probably also on how mobility issues impact their quality of life. However, the global scores that result from several questions are based on different mobility aspects or the impact of weather on mobility, for example. Not all these aspects are affected at the same time and not at the same level. If only a few of these aspects (over the 8 or 13 assessed) are impacted at first and improved during the study, the global score is only slightly changed but the owners can perceive these mobility aspects as being very important for them (ability to stand or play, for example) so that they consider the dog's mobility to be improved (62% considered their dogs improved at the end of the study).

It has to be noted also that, at the beginning of the study, the mobility of the recruited dogs was rather good (medium rate given for all scores) and the improvement could only be limited. Indeed, the dogs recruited mostly showed difficulty to stand and some form of stiffness or lameness (probably just after standing) but few showed difficulty to walk or move around, according to their owners. A quarter

of the owners (24%) even considered their dog's mobility as good or excellent at the beginning of the study (versus 60% at the end of the study).

This study is only based on the owner's perception and no veterinarian was involved either in the recruitment or the assessments during the study. Even if some validated tools were used (LOAD questionnaire [27]) to assess mobility, without a veterinarian's assessment at least for recruitment, there is no guarantee that the mobility issues observed by the owners were indeed due to joint disorders and OA. This lack of validation could explain, for example, why the LOAD score was only slightly improved. Further studies, involving veterinarians and a control group are therefore required to validate the efficacy of the chews, like the one done with a similar formulation of the Movoflex® Soft Chews in the USA [24].

However, even if clinical controlled studies are important to evaluate the efficacy of a product in dogs with a specific condition, they also have limitations that are not present when using owner perception studies. Indeed, the number of dogs recruited is usually lower in clinical studies and the population studied is limited to those dogs fitting the inclusion/exclusion criteria and therefore may not be representative of all dogs with mobility issues. Owner perception studies, on the contrary, can be interesting to evaluate the global effectiveness and appreciation of the product by owners.

Conclusion

In conclusion, Movoflex® Soft Chews are efficient to improve the dogs' mobility, as assessed by their owners. They are well accepted by dogs, safe, and appreciated by the owners. These promising data now need to be confirmed with clinical studies involving veterinarians.

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Conflict of Interest

All authors are Virbac's employees and the study was funded by Virbac.

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