

Aggressive dogs are characterized by low omega-3 polyunsaturated fatty acid status

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FROM ABSTRACT

Canine aggressive behaviour is one of the most common problems being reported by dog owners. However, the biochemical basis of this phenomenon remains unclear.

In humans, alterations in omega-3 plasma polyunsaturated fatty acids and elevated omega-6/omega-3 ratios have been linked to behavioural alterations, including aggression.

Thus far, however, the relationship between plasma polyunsaturated fatty acid status and aggression has not been investigated in the dog.

Eighteen adult male German Shepherd dogs, aged 4.9 ± 0.9 years, showing no clinical signs but aggression, were investigated.

Eighteen healthy male dogs, aged 4.8 ± 0.7 years, with a negative history of behavioural and neurological disorders served as controls.

Baseline fasting plasma polyunsaturated fatty acid composition was determined by gas chromatography.

Compared to normal dogs, aggressive dogs showed lower docosahexaenoic acid (22:6 n-3) concentrations and a higher omega-6/omega-3 ratio.

In addition, they showed reduced cholesterol and bilirubin concentrations compared to their normally behaving counterparts.

Altogether, our results suggest that low omega-3 fatty acids may adversely impact behaviour in dogs, resulting in greater propensity to aggression.

Whether omega-3 fatty acid supplementation may be useful to reduce aggressive behaviour in the dog deserves further investigation.

THESE AUTHORS ALSO NOTE:

"Aggressive behaviour is a common behavioural problem in dogs, resulting in bite injuries, reaching epidemic proportions."

"In humans, abnormalities in lipid metabolism have been found in a variety of mental disorders, including pathological aggression and anxiety."

Altered lipid profile may play a relevant role in hyperactivity, aggression and impulsiveness.

The relationship between blood lipid status and behaviour is mediated by central serotonergic activity. Central serotonergic activity is reduced among animals fed a low-fat/low-cholesterol diet.

Hypocholesterolemia occurs in aggressive dogs.

"Of great interest, human studies have also pointed to a role for alterations in omega-3 plasma polyunsaturated fatty acids and elevated omega-6/omega-3 ratios in the pathophysiology of aggression and hostility."

In this study, the aggressive group consisted of 18 German Shepherd dogs selected on the basis of aggressive behaviour. They all had a history of aggressive incidents and attacks without warning (bites toward humans).

Eighteen healthy male German Shepherd dogs with no history of behavioural and neurological disorders served as controls.

Fasting blood samples were collected and analyzed for arachidonic acid (20:4 n-6), eicosapentaenoic acid (20:5 n-3), docosahexaenoic acid (22:6 n-3) and omega-6/omega-3 ratio.

RESULTS

"There was a significant reduction in the concentration of bilirubin and total cholesterol in the aggressive group compared to the control group."

"Compared to normal dogs, aggressive dogs showed a significantly lower concentration of docosahexaenoic acid (22:6 n-3) and a higher omega-6/omega-3 ratio."

DISCUSSION

"There is consistent evidence from other studies, especially from human epidemiological investigations, that a low omega-3 polyunsaturated fatty acid status could be linked to aggressive behaviour."

Low cholesterol levels may also be correlated to canine aggressiveness.

“Results of our study showed that German Shepherd dogs with a history of aggressive behaviour displayed a significantly lower docosahexaenoic acid (22:6 n-3) concentration and a significantly higher omega-6/omega-3 ratio when compared with non-aggressive dogs.”

Several studies suggest that low-omega 3 fatty acid status may adversely impact serotonergic function in the central nervous system.

“The connection between hypocholesterolemia and dog aggression may similarly occur via altered production, reuptake, or metabolism of neurotransmitters.”

“Reduced serum cholesterol may be a biochemical feature associated with canine aggression.”

Reduced bilirubin may be related to dog aggressiveness, because bilirubin is neuroprotective to the central nervous system.

“In conclusion, our pilot study suggests that low concentrations of cholesterol, bilirubin, docosahexaenoic acid and a higher omega-6/omega-3 ratio may be biological correlates of aggressiveness in German Shepherd dogs.”

KEY POINTS FROM DAN MURPHY

- 1) Canine aggressive behaviour is one of the most common problems being reported by dog owners.
- 2) “Aggressive behaviour is a common behavioural problem in dogs, resulting in bite injuries, reaching epidemic proportions.”
- 3) “In humans, alterations in omega-3 plasma polyunsaturated fatty acids and elevated omega-6/omega-3 ratios have been linked to behavioural alterations, including aggression.”
- 4) In this study, compared to normal dogs, aggressive dogs showed lower docosahexaenoic acid (22:6 n-3) concentrations and a higher omega-6/omega-3 ratio.
- 5) Aggressive dogs also have reduced cholesterol and bilirubin concentrations compared to their normally behaving counterparts.
- 6) Low omega-3 fatty acids may adversely impact behaviour in dogs, resulting in greater propensity to aggression.
- 7) “In humans, abnormalities in lipid metabolism have been found in a variety of mental disorders, including pathological aggression and anxiety.”

- 8) Altered lipid profile may play a relevant role in hyperactivity, aggression and impulsiveness.
- 9) "Of great interest, human studies have also pointed to a role for alterations in omega-3 plasma polyunsaturated fatty acids and elevated omega-6/omega-3 in the pathophysiology of aggression and hostility."
- 10) Aggressive dogs also have a "significant reduction in the concentration of bilirubin and total cholesterol in the aggressive group compared to the control group."
- 11) "There is consistent evidence from other studies, especially from human epidemiological investigations, that a low omega-3 polyunsaturated fatty acid status could be linked to aggressive behaviour."
- 12) Low cholesterol levels may also be correlated to canine aggressiveness.
- 13) These authors suggest that low levels of omega-3 fatty acids and cholesterol are related to increased aggression because they both alter brain levels of the neurotransmitter serotonin.

COMMENTS FROM DAN MURPHY

This study brings up three interesting questions:

- 1) Are statin drugs that lower cholesterol being over-prescribed to the American public, causing behavioral problems, including aggression?
- 2) Could omega-3 supplementation reduce the need for SSRIs (selective serotonin reuptake inhibiting drugs [Prozac, Paxil, Zoloft, etc.]?)
- 3) Could omega-3 supplementation achieve better results than SSRI drugs, at a lower cost, and with no adverse reactions?