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# Risk factors of colic episodes in the horses in Albania

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**Abstract:**

*One-year study estimated the frequency and the risk factors that affect the occurrence of colic in the horse population in the region of Tirana. Details of 72 colic episodes, collected prospectively, were analyzed for a period of one year. The number of spasmodic/idiopathic colic cases in the 2-10-year-old group and the number of surgical colic in older than 10-year-old group were significantly greater than <2 years-old age group. Horses aged 2 to 10 years had a higher risk of occurrence of disease (P<0.05). Data of this study showed no significant difference between sexes (P<0.05). 20.8% of the colic episodes were due to change of husbandry conditions, 11.1% by frequent changing of weather condition, 8.3% related to work or transport in agriculture, 2.8% from sweet/high carbohydrates diet (fruit). Nutritional causes and lack of anthelmintic control programs are important risk factors for development of colic. Types of grass and*

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*hay and poor-quality roughage are suspected causes. A greater understanding of the factors involved in the development of spasmodic/idiopathic colic episodes would be a great advancement in equine welfare in the region of Tirana.*

**Key words**: colic, horses, risk factors, incidence, equine welfare

## INTRODUCTION

Classical medicine referred to »colic« as a disease of the gastrointestinal tract associated with obvious attacks of abdominal pain (dolor coli). Gratzl, 1952 drew attention to abdominal spasm and abnormal gut motility as the common pathogenetic factors in most forms of colic. Many factors or stressors can easily lead to increased parasympathetic tone. Abnormal bowel motility may also result from an impaired vascular supply. Abnormal motility then leads to different forms of colic. The remaining forms can also be attributed to intestinal spasm of another genesis.

The history of the patient can provide vital clues as to the severity and possible etiology of the colic. Previous history of colic, including colic surgery, history of other surgeries, recent management changes, geographic area, breeding history and pregnancy status, duration and severity of pain, recent defecation, appetite, previous treatment, and response to treatment are all important components in the medical history of a colicky horse. Additionally, specific details as to feed, deworming, dentistry, history of medications (e.g., nonsteroidal anti-inflammatory drugs [NSAIDS], antibiotics), and activity level may also provide valuable diagnostic information. Factors that tend to increase risk of colic include inadequate deworming or dentistry, use of NSAIDS, stall confinement, recent feed changes, feeding of Coastal Bermuda grass hay, feeding of excessive concentrate or infrequent large meals, and off-the-ground feeding (Dietz *et al.,* 1984; Foreman *et al*., 1990). A link

has also been identified between cribbing and an increased likelihood of developing epiploic foramen entrapment (Behr *et al.,* 1981).

Risk factors for colic have been examined in several studies. A risk factor is not necessarily a cause but indicates that there is an increased risk of colic when a horse is exposed to it. Specific diseases are associated with signalmen or other factors. As an example, the foal has a higher risk of meconium impaction. Similarly, standard bred horses, Tennessee Walking horses, American Saddlebreds and Warmblood horses are all prone to abnormal enlargement of the inguinal rings, thus predisposing them to inguinal hernia. Horses with large colon impactions frequently have a history of an acute increase in stall time, reduced exercise and concurrent treatment (Dabareiner & White, 1995). Impactions are also associated with reduced water intake and with the feeding of coarse roughage to horses with poor teeth. Caeca impactions are anecdotally related to treatment with phenylbutazone or in a hospital, and dorsal colitis is associated with phenylbutazone administration. Inguinal hernias occur most frequently either during or immediately after breeding.

Though studies have evaluated risks in slightly different ways, several events appear to increase the risk of colic, including pregnancy, the period of lactation, change in diet, recent change in activity, transport, fever, and vaccination (Cohen *et al.,* 1995; Tinker *et al,* 1997). The risk was found to increase as the amount of grain fed increased, compared to horses not fed grain — those horses fed 2.5 kg/day or more had an increased risk of colic. Horses fed pelleted feeds and commercially mixed sweet feeds also had an increased risk of colic when compared to horses fed no concentrates (Tinker *et al,* 1997). Horses with a previous history of colic were more likely to have colic than horses with no such history (Cohen *et at,* 1995; Tinker *et al,* 1997). This study was conducted on the general horse population in the rural areas of Tirana district.

The objectives of this study were to 1) quantify the types of colic encountered in general practice in Tirana region; 2) identify risk factors associated with these colic types; 3) record the seasonal incidence of colic and establish whether this was correlated with changes in weather and 4) specifically, to identify any risk factors of simple spasmodic/idiopathic colic.

## MATERIAL AND METHOD

A prospective study was conducted on 15 rural areas to identify risk factors for equine colic for one year in Tirana district. The study achieved on the 72 horses of Albanian crossbred to estimate the incidence rate of equine colic and its correlation to causes or risk factors. The horses were divided by sex and age groups: young [<2 years], middle [2–10 years], old [>10 years]. A questionnaire (including location of farm, breed, sex, age of animals, prevention programs, and types of feedstuffs) was filled out for each farm. The association between colic and individual horse risk factors related to management, housing, pasture, use, nutrition, health and events was first examined by univariate statistical analysis. The criteria for diagnosis of colic included observation and clinical examination. The degree of correlation between monthly frequency of colic and weather will be calculated using Pearson's correlation coefficient (r). The test statistic was compared with standard tables to determine significance ($P<0.05$). The proportion of each colic type within the different age and sex categories was compared by Chi-squared analysis. Again, the significance level was set at $P<0.05$.

## RESULTS

The current study evaluated the frequency and associated risk factors of colic during one-year evaluation in horse farms of Tirana region. During the period from March 2015 and

onwards, the records of 72 colic episodes, collected prospectively from first opinion cases were analyses. The classification of each colic episode and the age, sex is shown in Table 1.

**Table 1: The number of different colic cases based on sex, and age recovered over one-year period**

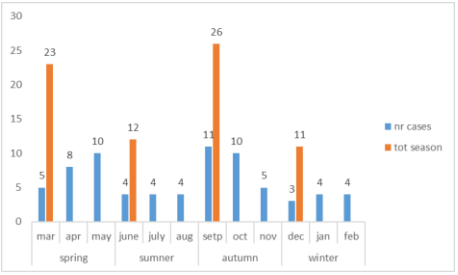
| | Age (years) | | | Sex | | |
|---|---|---|---|---|---|---|
| **Colic Cases** | <2 | 2-10 | >10 | F | M | Total (%) |
| Spasmodic/idiopathic | 3 | 23 | 13 | 18 | 21 | 39 (54.2) |
| Flatulent | - | 2 | 2 | 2 | 2 | 4 (5.6) |
| Impactions | - | 5 | 6 | 6 | 5 | 11 (15.3) |
| Surgical | - | - | 3 | 1 | 2 | 3 (4.2) |
| Colitis | 3 | 7 | 5 | 8 | 7 | 15 (20.8) |
| Total | **6** | **37** | **29** | **35** | **37** | **72 (100)** |

A student test (t-Test: paired Two Sample for Means) was conducted to compare between sex groups in all colic types investigated. No difference was found between groups ($P<0.05$).

A Chi-square test was conducted to investigate the association between the age 2-10 and over 10 years old and the spasmodic/idiopathic colic (Agresti, 2012). The odds ratio, $\chi^2$ and its 95% confidence interval were calculated to measure the magnitude of the association. A 5% level of significance was used to evaluate significance of association, i.e. the p-value was considered significant if it was less than 0.05. The analyses were conducted using Saturator statistical program (Dhand and Khatkar, 2014). The odds ratio indicates that the 2-10 years old age group has 2.02 (OR 2.02 and $\chi 2$ 1.97) times the odds of the outcome than the over 10 years old group. Also, we are 95% confident that the odds ratio in the population (from where the sample was obtained) would be between 0.75 and 5.43.

In the total number of colic cases recorded in the study areas, a greater percentage of horses from 2-10 years old age group and older than 10 years, suffering more from almost all types of colic compared with group up to 2 years of age. Horses older than 10 years showed a higher percentage of surgical colic 3 (4.2%) compared with other groups ($P<0.05$). There was no

significant difference between sexes (P<0.05). The effect of age and sex on each colic type showed only two significant differences between categories. The number of spasmodic/idiopathic colic cases in the 2-10-year-old group and the number of surgical colic in the over 10-year-old group were significantly greater than <2 years-old age group. Horses aged 2 to 10 years had a higher risk of occurrence of disease (P < 0.05).




**Graph 1. Seasonal frequency of colic episodes**

This study showed different frequency of colic episodes based on the months of the year. Careful inspection of Graph 1 shows an increased frequency of colic during the months of spring and autumn. In the surveillance conducted so far, we have not yet determined statistically whether or not there is such a correlation between weather and the frequency of colic.

Of the 39 horses with spasmodic/idiopathic colic, only 31 (79.5%) had any identifiable risk factors in their histories. Table 2 lists these possible predisposing factors. 20.8% of the colic episodes were due to change of husbandry conditions, 11.1% by frequent changing of weather condition, 8.3% related to work or transport in agriculture, 2.8% from sweet/high carbohydrate diet (fruit).

**Table 2: Spasmodic/idiopathic colic cases — possible risk factors**

| | |
|---|---|
| Change of husbandry conditions / related to parasites | 15 |
| Dramatic change in weather | 8 |
| Associated with exercise/ Post transportation | 6 |
| Sweet/high carbohydrate diet | 2 |
| Total | **31** |

## DISCUSSION

The colic of the horse can therefore today again be considered as a largely path genetically and a etiologically uniform syndrome and they may therefore be treated more or less in a uniform manner. In many countries, colic cases form an important part of the veterinarian's case load, and correct diagnosis and prompt corrective treatment are of paramount importance. Colic may be caused by a number of conditions. The signalmen of the horse can provide some information that may increase the degree of suspicion for a specific cause of colic. Weanling-age foals are more prone to acarida impactions (Nelson *et al*, 1979; Dietz *et al,* 1984) whereas younger foals are at higher risk for small intestinal volvulus or intussusception (Latimer *et al,* 2003). Older horses have a far greater likelihood of developing strangulating lipomas (White, 1990; Traub *et al.,* 1983). In general, Arabians are considered to be at higher risk for colic than other breeds and are specifically predisposed to ilea impaction, small colon impaction, and enterolith formation (Dietz *et al,* 1984). Miniature horses, especially younger horses, are prone to small colon impactions and fukalites (Dietz *et al,* 1984; White, 1990). Standardbreds, Tennessee Walking Horses, and Warmblood stallions have a higher risk of developing inguinal hernias (Dietz *et al,* 1984; White 1990).

With regard to sex, stallions are susceptible to testicular torsion in addition to inguinal hernias (White,1990). Postpartum mares are predisposed to torsion of the large colon (Dietz *et al,* 1984; White, 1990), whereas colic in a late-gestation mare may indicate normal parturition or dystocia. Pregnant mares also exhibit signs of colic with uterine torsion (Dietz *et al,* 1984; Robinson, 2009). Nonpregnant mares can have mild transient signs of colic associated with ovarian activity.

Many factors, formerly considered to »cause« colic, derange the autonomic nervous system and can precipitate

attacks of colic. These factors, often climatic, include surface cooling of the skin (air stream) or stomach (cold water). Certain other climatic factors cannot often be assessed so easily. This study showed different frequency of colic episodes based on the months of the year, explained by the Mediterranean climate of Albania. Some authors have suggested, or proved, a correlation between weather and the incidence of colic (Barth, 1982; Rollins and Clement, 1979). However, in this study conducted so far, we have not yet defined statistically whether or not there is such a correlation. Veterinarians and owners frequently associate weather changes with increased frequency of colic, but many studies have been unable to find statistical evidence of increased risk. Early reports from Europe suggested weather changes were associated with the highest incidence of colic specifically changes to cold and damp conditions or to warm and wet during advancing weather fronts (Barth, 1980). Colic cases occur more frequently in the presence of a west weather front, and not only associated with the arrival of a warmer moist airstream at the start of an area of low pressure (warm air active advection), but also with the low-pressure effect of a labile layered cold airstream advancing behind a low-pressure airstream (cold air active advection), often associated with thunderstorms. The colic incidence is also higher in very sunny periods with persistent strong sunshine (e.g. in Alps with foehn) (Barth, 1980).

A study in Texas found an increased risk of colic associated with weather changes as recalled by owners of horses with colic (Cohen *et al,* 1999b). Cold weather, which affects water intake, has been linked to increased impaction colic. When examined as a direct exposure factor in a Virginia-Maryland study, weather did not appear to be related to colic (Tinker *et al,* 1997b). Graph 1 shows an increased frequency of colic during the months of spring and autumn. This may be due to changing grass quality or changing management practices at these times of year rather than changing weather conditions.

The calculation of a correlation coefficient using mean monthly temperature and mean monthly rainfall will be an attempt to give greater significance to temperature and rain during warm weather when grass is growing.

The cause of the instability of the autonomic nervous system is not yet clear. There are numerous causes of colic, though the causes, of most colic episodes are unknown. Table 2 presents some interesting potential factors related to the emergence of individual colic episodes in the spasmodic/idiopathic category. The association of these factors with the occurrence of colic episodes is circumstantial only because it is impossible to prove a direct causal relationship. Nutritional causes and lack of anthelmintic control programs are important risk factors for development of colic.

It is impossible to determine the number of colic episodes in our study that were related to parasites. Parasites (acarida, tapeworms, strongest) are associated with an increased colic risk of colic by in several studies (Uhlinger, 1992; Proudman and Holdstock, 2000). Parasites have been shown to cause colic, and parasite control programmers have reduced its incidence, specifically implicating small strongly infection as a cause (Uhlinger, 1990). Small strongly migration can cause inflammation, and it has been speculated that it might cause alterations in motility. Large strongest cause alterations in the cranial mesenteric vasculature, and can cause thromboembolic colic (White, 1981). Tapeworm infection has been associated with caeca and ileocecal problems, and has been shown to be a risk factor (Proudman and Edwards, 1993). The association of parasitic forms may be even higher because it is not a common practice the use of anthelminthic drugs by horse owners in Tirana. No regular parasitic control programs were used on all farms, and there was no documented diagnostic analysis of parasites in horses, nor in random fecal samples.

Further precipitating factors are qualitative and quantitative dietary errors (e.g. sudden change of food, inadequate fiber intake) and husbandry faults (overexertion; irregular work). Types of grass and hay and poor-quality roughage are suspected causes. Gradual change of diet to new types or amounts of food has long been recommended and is supported by some findings (Murray,1997). Little information is available about specific types of food or the measurement of specific nutrients in the food, such as minerals or fiber that cause colic. Apart from certain anatomical features of the equine gastrointestinal tract, food composition and the texture of the intestinal contents are critical factors in the development of certain types of colic. Easily fermentable material (fresh clover, poor quality fodder, maize) can, when these foodstuffs accumulate, cause increased gas production and gastric or intestinal tympani. Much rapidly fermenting feed in the stomach, retained due to spastic closure of the pylorus, can cause acute gastric dilatation**.** Large volumes of poor quality roughage can lead to impaction.

The unusual plant material reported to have been eaten most often was apples (associated with animals grazing in, or adjacent to, orchards in the autumn). The passage of readily available carbohydrate into the caecum and large colon would disrupt the normal microbial physiology of this section of intestine (Argenzio, 1979). The change in management most commonly associated with spasmodic/idiopathic colic was turnout onto lush pasture in the spring.

When examining risks in the normal population, where idiopathic colic is most common, there appears to no increased risk for sex. This study showed no significant difference between sexes for occurrence of colic (t-Test), and this is also supported by other studies (Sembert, 1975; Cohen, 1997; Kaneene *et al,* 1997). Arabian horses are reported to be at higher risk than other breeds, and horses aged 2-10 years have a higher risk of colic than young horses (foals, weanlings and

yearlings) or those over 10 years of age (Cohen *et al,* 1995; Reeves *et al,* 1989; Tinker *et al,* 1997).

In our study, horses between 2 and 10 years of age had the highest risk of the disease (Chi-square test). Tinker *et al,* 1997 and Traub and Kopral 2001 reported that horses younger than 2 years have the lowest risk of colic. In the study of Kaneene *et al*, 1997 the risk of colic correlated with an increase in age. Change of diet, increased exposure to parasites, and decreased colon activity are factors that contribute to the occurrence of colic in adult horses (Cohen *et al,* 1999b; Seitzinger *et al*, 2000). In this study, it was difficult to interpret why horses in the 2- to 10-year-old age group should suffer more from spasmodic/idiopathic colic episodes than horses in other age groups. The fact that horses in this age group face the greatest physical activity demands, and that they are subjected to more frequent changes of ownership, may be considered important reasons for the interpretation of this result. The age distribution of animals classified as surgical colic is interesting. Although the number of such colic episodes is small 3 (4.2%), 100% of them were recorded in animals older than 10 years. This is statistically different when compared with another age group (Chi-square test). We have not been able to define the type of colic in the surgical category of colic. However, the limited number of colic cases indicates to interpret the results with caution. These cases are referred by veterinarians included in the study and none of them has implemented necropsy examination to determine the exact cause of death and side where the pathological lesions happened.

## CONCLUSIONS

We identified several risk factors for spasmodic/idiopathic colic. Other associated factors are the subject of further research. Most risk factors (feeding practices, parasitism, and management) require more investigations to better understand

their impact on this disease. Identification of risk factors for spasmodic/idiopathic colic may highlight high risk horses and may allow intervention strategies to be introduced to reduce the incidence of the disease. The information's provided by this study confirm that colic affects the health and welfare in the aging population of horses. We conclude that age 2-10 years increase the risk of colic in horses. We have also reported the 12-month frequency of colic and possible associated risk factors in a population of working horses in Albania. This study showed a seasonal component to certain types of colic. These patterns appeared to coincide with either times of managemental change or periods when horses are more likely to be intensively managed. Further studies are required to identify the determinants of the observed seasonality.

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