ABSTRACT

The present study was conducted on 36 clinical cases of dogs of either sex, different breed and age groups. The Selection of animals was performed on the basis of collection of detailed history, predominant clinical signs and haematobiochemical observations. In present study, the overall Incidence of dermatological emergencies was 17.14%. The sex wise incidence of dermatological emergencies was recorded as 61.11% in male (22/36) was higher than 38.89% in female (14/36) dogs. The highest Incidence of dermatological emergencies was recorded as 30.56% in dogs of 1-3 years age group and lowest incidence was recorded 16.67% in dogs more than 6 years age. The German shepherd breed has the highest incidence 33.33%, of dermatological emergencies. Acute otitis externa has the higher incidence (36.11%), wound and lacerations (19.44%), acute moist dermatitis and anal sac disease (11.11%) incidence each, aural haematoma (8.33%), cutaneous foreign bodies and juvenile cellulitis (5.56% each) and lowest (2.78%) in cutaneous abscess.

The Hb and PCV were found to be decreased in cases of acute otitis externa, wound and lacerations, acute moist dermatitis, aural haematoma, cutaneous foreign body, juvenile cellulitis and cutaneous abscess. Leukocytosis was found in wound and lacerations, anal sac disease and juvenile cellulitis.

In present study, alterations in biochemical values of ALT, AST, ALP and TP were justified. The values of ALT and ALP were found increased in acute otitis externa, anal sac disease and acute moist dermatitis. Increase in the values of total protein were observed in the present study in otitis externa, anal sac diseases, acute moist dermatitis and juvenile cellulitis.
In present study, several surgico-therapeutic strategies were used to treat various dermatological emergencies. The dermatological emergencies were although, not life-threatening and the individual cases carried a favourable prognosis. The surgico-therapeutic management of various dermatological emergencies in dogs have been found effective with highest (100%) recovery in wounds and lacerations, acute moist dermatitis, aural haematoma, cutaneous foreign bodies, juvenile cellulitis and cutaneous abscess, followed by acute otitis externa (92.31%) and lowest 75% in anal sac disease with less incidence complications encountered during treatment.
अनुक्षेपण

वर्तमान अध्ययन अलग-अलग लिंग, नस्ल और आयु समूहों के श्वानों पर 36 नैदानिक मामलों में आयोजित किया गया। मामलों के चुनाव में विस्तृत इतिहास का संग्रह, विशुद्ध नैदानिक लक्षण और रूढ-जैवसायतिक रिपोर्ट के आधार पर निकाला गया था। वर्तमान अध्ययन में, चर्म आपात स्थितियों की 38.89% से अधिक थी। चर्म आपात स्थितियों की सबसे ज्यादा घटनाएं 1-3 वर्ष आयु वर्ग के श्वानों में 30.56% के रूप में दर्ज की गयी और सबसे कम घटना 6 साल की उम्र से अधिक श्वानों में 16.67% दर्ज की गयी। जर्नल शेफड नस्ल में चर्म आपात स्थितियों की सबसे ज्यादा घटनाएं 33.33% पाए गयी। बाह्य कर्ण शौथ की उच्च (36.11%), धाव और विदारण (19.44%), तीब्र नम त्वचाशोथ और गुदा शैली रोग 11.11% (प्रत्येक), कर्ण रक्तगुल्म (8.33%), त्वचीय बाह्य निकायों और किशोर सेंल्युडलाइटिस 5.56% (प्रत्येक) तथा त्वचीय फोड़ में 2.78% (सबसे कम) घटनाएँ पायी गयी।

एच.बी. और पी.सी.वी. तीब्र बाह्य कर्ण शौथ, धाव और विदारण, तीब्र नम त्वचाशोथ, कर्ण रक्तगुल्म, त्वचीय बाह्य निकाय, किशोर सेंल्युडलाइटिस और त्वचा संबंधी फोड़ के मामलों में कम पाए गए। सत्त्वकोशातिवृद्धि, धाव और विदारण, गुदा शैली रोग और किशोर सेंल्युडलाइटिस में पायी गयी।
वर्तमान अध्ययन में एएलटी, एएसटी, एएलपी और टी.पी. के जैव रासायनिक मात्रा में परिवर्तन उचित थे। एएलटी और एएलपी की मात्रा तीव्र बाह्य कण्ण शोध, गुदा शैली रोग और तीव्र नम त्वचाशोध में बढ़ी हुई पायी गयी। वर्तमान अध्ययन में कुल प्रोटीन की मात्रा में वृद्धि बाह्य कण्ण शोध, गुदा शैली रोग, तीव्र नम त्वचाशोध और किशोर सेल्युलाइटिस में देखी गयी।

वर्तमान अध्ययन में, कई शल्य-औषधीय रणनीतियां विभिन्न चरम सम्बन्धी आपात स्थितियों के इलाज के लिए इस्तेमाल की गयी। हालांकि, चरम सम्बन्धी आपात स्थितियों जीवन के लिए खतरा नहीं थी और अलग-अलग मामलों में प्रत्येक रोग का अनुकूल निदान किया गया। श्वानों में विभिन्न चरम सम्बन्धी आपात स्थितियों के शल्य-औषधीय प्रबंधन को निरन्तर किया जिसमें घाव और विदारण, तीव्र नम त्वचाशोध, कण्ण रक्तगुल्म, त्वचीय बाह्य निकायों, किशोर सेल्युलाइटिस और त्वचा संबंधी फोड़ा में सबसे ज्यादा (100%) सुधार पाया गया और उपचार के दौरान जटलताओं के साथ तीव्र बाह्य कण्ण शोध में (92.31%) सुधार और सबसे कम सुधार गुदा शैली रोग में 75% मिला।
Appendix-1

List of companies for chemicals, reagents and medicines.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Company name</th>
<th>Address</th>
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<tbody>
<tr>
<td>1.</td>
<td>Biolab</td>
<td>J-245 MIDC Tarapur, Bolsar- 401501, MS India</td>
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<td>2.</td>
<td>SPAN</td>
<td>173-B, New industrial estate, VDHNA, Surat- 394210</td>
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<td>3.</td>
<td>Labcare</td>
<td>16/A, Sita estate, Aziz Baug, Chembur Mumbai- 400074</td>
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<td>4.</td>
<td>CDH</td>
<td>7/28, Varadaan house Ansari road, Daryaganj New Delhi- 110002</td>
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<td>5.</td>
<td>Intas</td>
<td>Matoda- 382210 Ahmdabad, India</td>
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<td>6.</td>
<td>Glaxo</td>
<td>Dr. Annie Besant road, Mumbai- 400030</td>
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<td>7.</td>
<td>Savavet</td>
<td>Atul Kataria chowk old Delhi Gurgaon road, Gurgaon-122016</td>
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<td>8.</td>
<td>Virbac</td>
<td>6th floor, western edge-1,604, Borivali East, Mumbai- 400066</td>
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<td>9.</td>
<td>Systopic</td>
<td>Pragati chambers, Ranjit nagar New Delhi- 110008</td>
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<td>10.</td>
<td>Jannsen Cilag</td>
<td>P.O. Box 79, Buckinghamshire, HP144HJ, UK</td>
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<td>11.</td>
<td>Zydus AHL</td>
<td>Astron tech. park 5th floor Amhdabad- 380015 India</td>
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<td>12.</td>
<td>Cipla</td>
<td>Verna Industrial estate, Verna salcette, Goa- 403722</td>
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<td>13.</td>
<td>Laborate</td>
<td>E-11, Industrial area, Panipat- 132103</td>
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<td>PCI</td>
<td>Tipra, Barotiwala, Solan (H.P.)</td>
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<td>15.</td>
<td>USV</td>
<td>Arvind Vithal Gandhi Chowk, Govandi estate Mumbai- 400088</td>
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<td>16.</td>
<td>ITC</td>
<td>37 J.L. Nehru road Kolkata- 700071</td>
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<td>17.</td>
<td>Bayer</td>
<td>Hiranandini garden, Central Avenue Mumbai- 400076</td>
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<td>18.</td>
<td>Himalaya</td>
<td>Makali, Banglore, KA, 562162, India</td>
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<td>19.</td>
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<td>L-18, Verna Industrial area, Verna salcette, Goa</td>
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<td>20.</td>
<td>Dosch</td>
<td>15-C Laxmi Industrial estate, Andheri (West) Mumbai- 400053</td>
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<td>21.</td>
<td>Glenmark</td>
<td>8/2 Mahalaxmi chambers, Mumbai- 400026</td>
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<td>22.</td>
<td>Intervet</td>
<td>Briahnagar, Off Pune-nagar road, Wagholi- 412207, Pune</td>
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</table>
A STUDY ON SURGICO-THERAPEUTIC
MANAGEMENT OF VARIOUS
DERMATOLOGICAL EMERGENCIES IN DOGS

श्वानों में विभिन्न चर्म सम्बन्धी आपात स्थितियों
के शल्य-औषधीय प्रबंधन पर एक अध्ययन

Ravendra Singh
B. V. Sc. & A. H.

THESIS

Master of Veterinary Science
(Veterinary Surgery and Radiology)

2016

Department of Veterinary Surgery and Radiology
College of Veterinary and Animal Science, Bikaner
Rajasthan University of Veterinary and Animal
Sciences, Bikaner-334001
A STUDY ON SURGICO-THERAPEUTIC MANAGEMENT OF VARIOUS DERMATOLOGICAL EMERGENCIES IN DOGS

श्वानों में विभिन्न चर्म सम्बन्धी आपात स्थितियों के शल्य-औषधीय प्रबंधन पर एक अध्ययन

THESIS

Submitted to the
Rajasthan University of Veterinary and Animal Sciences, Bikaner
In partial fulfillment of the requirements for
the degree of

Master of Veterinary Science
(Veterinary Surgery and Radiology)

FACULTY OF VETERINARY & ANIMAL SCIENCE

By

Ravendra Singh
B. V. Sc. & A. H.

2016
INTRODUCTION
REVIEW
OF
LITERATURE
MATERIALS AND METHODS
RESULTS
DISCUSSION
ABSTRACT
(ENGLISH AND HINDI)
Fig. 1: **Case 1** Acute otitis externa in dog with erythema and discharge on day of presentation (A); At recovery (B)

Fig. 2: **Case 2** Acute otitis externa with ceruminous discharge in dog on day of presentation (A); At recovery (B)
Fig. 3: (Case 3) Acute otitis externa with ceruminous discharge in dog on day of presentation (A); At recovery (B)

Fig. 4: (Case 4) Acute otitis externa with aural pruritus and oedema in dog on day of presentation (A); At recovery (B)
Fig. 5: **(Case 5)** Acute otitis externa with purulent discharge in dog on day of presentation (A); At recovery (B)

Fig. 6: **(Case 6)** Acute otitis externa with purulent discharge and inflamed ear canal in dog on day of presentation (A); At recovery (B)
Fig. 7: (Case 7) Acute otitis externa with purulent discharge in pup on day of presentation (A); Healing ear canal during follow up treatment (B)

Fig. 8: (Case 8) Acute otitis externa with stenotic ear canal and ceruminous discharge in dog on day of presentation (A); Zepp's operation performed (B); At recovery (C)
Fig. 9: (Case 9) Acute otitis externa with excoriation on day of presentation in dog (A); Inflamed ear canal during follow up treatment (B)

Fig. 10: (Case 10) Acute otitis externa with greasy discharge on day of presentation in dog (A); At recovery (B)
Fig. 11: (Case 11) Acute otitis externa with purulent discharge and dirt in ear canal on day of presentation in a pup (A); At recovery (B)

Fig. 12: (Case 12) Acute otitis externa with inflamed ear canal and greasy discharge in dog on day of presentation (A); Recovery on follow up treatment (B)
Fig. 13: (Case 13) Acute otitis externa with inflamed ear canal and greasy discharge in dog on day of presentation (A); At recovery (B)

Fig. 14: (Case 14) Maggot wound at proximal posterior region of right thigh in dog on day of presentation (A); At recovery (B)
Fig. 15: **(Case 15)** Wound at head region in dog on day of presentation (A); Healing stage during follow up treatment (B)

Fig. 16: **(Case 16)** Dog bite wound at lower neck region in dog on day of presentation (A); At recovery (B)
Fig. 17: **(Case 17)** Avulsion wound at right antero-medial aspect of knee joint in dog on day of presentation (A); Recovery on follow up treatment (B)

Fig. 18: **(Case 18)** Lacerated wound at upper lip in dog on day of presentation (A); Surgical repair by applying sutures (B); At recovery (C)
Fig. 19: (Case 19) Avulsion wound at right maxillary region in dog on day of presentation (A); Recovery during follow up treatment (B, C)
Fig. 20: **(Case 20)** Maggot wound at inner pinna of left ear in dog on day of presentation (A); At recovery (B)

Fig. 21: **(Case 21)** Anal gland sac adenocarcinoma with ulceration in dog on day of presentation (A); After surgical removal (B)
Fig. 22: **(Case 22)** Anal gland abscess palpation and expression of purulent discharge in dog on day of presentation (A, B)

Fig. 23: **(Case 23)** Anal gland abscess in dog and expression of malodourous purulent thick discharge on day of presentation (A, B)
Fig. 24: **(Case 24)** Anal sac impaction on day of presentation (A); Sacculectomy (B); Surgically removed impacted anal sac (C); At recovery (D)
Fig. 25: (Case 25) Acute moist dermatitis at throat region in dog on day of presentation (A, B); At recovery (C)

Matting of hairs

Swollen and pruritus

Fig. 26: (Case 26) Acute moist dermatitis at upper neck region in dog on day of presentation (A); Recovery during follow up treatment (B, C)
Fig. 27: (Case 27) Acute moist dermatitis at right hip region with erythematous and plaque like area in dog on day of presentation (A); Follow up recovery (B, C, D)
Fig. 28: (Case 28) Acute moist dermatitis with matting and crushing of hairs along with swollen and pruritic area at right cheek on day of presentation (A, B); Follow up recovery (C, D)
Fig. 29: **(Case 29)** Aural haematoma on day of presentation and application of vacutainer with scalp vein set by applying nick incision (A, B); At recovery (C)

Fig. 30: **(Case 30)** Aural haematoma on day of presentation (A); Application of horizontal interrupted mattress sutures using I/V set pieces (B); At recovery (C)
Fig. 31: (Case 31) Aural haematoma on day of presentation and placing of horizontal interrupted mattress sutures using I/V set pieces (A, B, C); At recovery (D)
Fig. 32: (Case 32) Cutaneous foreign body (Thorn) at interdigital space in dog on day of presentation (A); At recovery (B)

Fig. 33: (Case 33) Cutaneous foreign body (Thorn) at interdigital space in dog on day of presentation (A); Manual removal (B); At recovery (C)
Fig. 34: **(Case 34)** Juvenile cellulitis with oedema, papules and crust at facial mucocutaneous junction in pup on day of presentation (A); At recovery (B)

Fig. 35: **(Case 35)** Juvenile cellulitis with oedema, papules and crust at facial mucocutaneous junction in pup on day of presentation (A); At recovery (B)
Fig. 36: (Case 36) Cutaneous abscess confirmed by exploratory puncture with needle in dog on day of presentation (A); Draining of pus after criss-cross incision (B); At recovery (C)
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INTRODUCTION

Skin is the largest single system in the body which has its own importance in the life process of all living creatures. The significance of skin ailments of dogs becomes more significant because of their zoonotic nature, besides this, skin is the most sensitive part of dog's body which has aesthetic virtues to pet owners. The skin is a large, metabolically active organ system that serves many important functions. It prevents desiccation and dehydration, act as a sensory organ, immune regulation, and is the receptor for the perception of touch, pressure, vibration, heat, cold, pain. It prevents trauma, protects against invasion of microorganism and noxious chemicals, and regulates temperature changes within the body (Aiello, 2000).

Skin may reflect the state of health of the animal, as well as indicate the presence of internal diseases, and act as a storage reservoir for certain nutrients. “Healthy skin means a healthy pet”. The health of a pet's skin and the quality of the hair coat are affected by nutrient imbalance that involve energy, protein, vitamin A, vitamin E, essential fatty acids, and certain minerals. It has been estimated that 20–75% cases of small dogs have skin problems as the main or concurrent complaint (Feizo et al, 1998; Scott et al, 1995).

Dermatological disorders are most commonly encountered problems and hardest to resolve in small animal medicine (DeBoer et al, 2001; Hill et al, 2006). Dermatological diseases are major concern for veterinary professionals due to its multifaceted causative agents, higher cost of treatment, long term management and effect on animal such as distress, irritation, offensive smell, hair fall and coat appearance (Senapati et al, 2014). Besides these, some dermatological disorders are potential source of number of zoonotic diseases (Parish and Schwartzman, 1993).
Successful management of skin diseases in dogs requires thorough knowledge in disciplines like bacteriology, mycology, parasitology, immunology, allergology, endocrinology and oncology. Although, the field of dermatology is complex but a large number of cases may be achieved through patient relief, owner satisfaction and gratification of clinician. In order to accomplish this goal, it is necessary to follow a method, to master it, to refine it and to ultimately model it (Jasmine, 2010).

The skin disease accounts about 25% morbidities in small animal practice (Grant and Thoday, 1994). In dogs, most common groups of dermatological disorders encountered were bacterial folliculitis, furunculosis, allergic dermatitis, endocrinopathy, neoplasia, ectoparasitism, immune-mediated dermatitis, atopic dermatitis, food hypersensitivity, flea bite hypersensitivity and seborrhoea.

Canines suffer with large number of dermatological emergencies that require thorough clinical examination using various diagnostic methods to identify the cause, location, extent and severity of lesions that cause dermatological emergencies. Dermatological emergencies are important because skin is first line of defense to outer microorganism, any breach in this organ cause direct entrance. Many dermatological conditions cause mild, localised signs, some, such as erythema multiforme, toxic epidermal necrolysis, cutaneous drug eruptions, and thermal burns, can cause severe cutaneous signs and may have serious systemic consequences (Kersey et al, 2013).

Commonly occurring dermatological emergencies in canine are lacerations, bite wounds, degloving injuries, burns, abscesses, toxic epidermal necrolysis, erythema multiforme, juvenile cellulitis, acute moist dermatitis, cutaneous foreign bodies, aural haematoma, acute otitis externa, anal sac disease. In these conditions, dogs may present on an emergency basis and require intensive monitoring, diagnosis, and care.
Dermatological emergencies are the conditions that may appear mild initially but that can prove serious or fatal at a later stage (Bellis, 2014). So immediate attention to these dermatological emergencies is much needed to save dog’s life.

Besides medical management, nutrition plays a fundamental role in cutaeneous homeostasis and treatment of many dermatoses. The correction of dietary imbalances (especially with respect to zinc and essential fatty acids) is a necessary factor in good dermatological therapy (Tewari et al, 2013).

Blood is an important medium in assessing the health status of animals. Both the physiological and pathological conditions of animals can be assessed by the evaluation of haematological and biochemical analyses of the blood. Though sample work has been done on establishing the baseline values of biochemical and hematological parameters of dogs (Khan et al, 2011).

Most common skin diseases can be clinically distinguished by recognising their basic patterns. The skin and adnexa are easily accessible (Wesche and Casey, 2005). In view of importance of clinical management of various dermatological emergencies in dogs, the present study was undertaken with the following objectives:

I. Clinical diagnosis of various dermatological emergencies in dogs
II. Haemato-biochemical status of various dermatological emergencies in dogs
III. Surgico-therapeutic treatment and management of various dermatological emergencies in dogs
REVIEW OF LITERATURE

Coffey (1970) conducted surgical treatment of otitis externa in a dog and the indications for surgical treatment were discussed and postoperative care of the wound consists of the topical application of sulphanilamide powder.

Maestrone and Brandt (1979) evaluated the therapeutic efficacy of a 0.5% cuprimyxin plus 1% hydrocortisone acetate-water-base suspension in 130 clinical cases of otitis externa in dogs. The otic microbial flora was studied before treatment in 125 (96%) of the dogs, with multiple isolates recovered from 70%, yeasts from 65%, and fungi from 5% of the animals which were sensitive to cuprimyxin. An adverse reaction (pain at the time of first application) was observed in 1 (0.8%) animal.

Oldenkamp and Elzinga (1979) described clinical findings following the instillation of an aqueous solution containing natamycin, neomycin and hydrocortisone into the ears of dogs exhibiting the signs of otitis externa. A favourable response was noted clinically in 95% and microbiologically in 86% of the cases treated.

Mueten et al (1981) described clinical, gross, and light microscopic findings for 36 dogs, 33 females and 3 males, with adenocarcinomas arising from the apocrine glands of the anal sac. Remission of hypercalcemia by tumour ablation and recurrence of hypercalcemia with tumour regrowth suggested that the tumour produced a substance that caused hypercalcemia predominantly in female dogs.

Kagan (1983) surgically treated aural hematomas in 9 dogs by manual expression through stab incisions in the pinna and placement of
indwelling silicone rubber drains, without compression bandaging. The drains were well tolerated in all animals. Seromas developed in 2 ears when the drains were removed at 7 and 10 days, but the seromas resolved when the drains were replaced. Healing without deformation of the pinna was obtained when the drains were maintained 13 to 28 days.

Wilson (1983) treated auricular hematomas in 35 dogs and 12 cats with a drainage method utilising a particular bovine teat tube. The method was easy to perform and required a minimum of expandable materials. Animals were quickly returned to normal activity, aftercare was simple, healing was rapid, and the healed ear was cosmetically acceptable. Complications that developed in 7 animals were related to the time of tube removal.

Panciera and Bevier (1987) diagnosed toxic epidermal necrolysis resulted after 19 days of treatment with 5-fluorocytosine and amphotericin B. After discontinuation of the 5-fluorocytosine and amphotericin B and treatment with cephradine and ketoconazole, the toxic epidermal necrolysis resolved. Treatment was completed without further complication by using amphotericin B and ketoconazole concurrently.

Surgical management of otitis externa uses the techniques of lateral ear canal resection and vertical ear canal ablation (Bradley, 1988). Mason et al (1988) treated 30 dogs with end-stage otitis by either unilateral or bilateral total ear canal ablation or lateral bulla osteotomy. The results in 23 dogs were graded as excellent or improved. 1 dog died of intraoperative haemorrhage. Complications during the period from suture removal to follow-up included para-ural fistulation (3 dogs), facial nerve paralysis (5 dogs), and head tilt (3 dogs).
Tirgari (1988) described a technique for impregnating canine anal sacs with a dental mould material. After the mould has set the sacs can be ablated surgically. The method was efficient, quick and simple.

White et al. (1989) evaluated the clinical, laboratory, and therapeutic results in 15 dogs having juvenile cellulitis. Mandibular lymphadenopathy was observed in 14 dogs, and was not associated with skin lesions in 5 dogs. Edema, pustules, papules, or crusts were noticed periorally, periocularly, on the chin or muzzle, or in the ears of dogs with skin lesions while 4 dogs had signs of pain on manipulation of their joints. All dogs treated concurrently with antibiotics and corticosteroids responded favourably. They suggested concurrent treatment with antibiotics (cephalosporins) and prednisone (2.2 mg/kg) as the most consistently effective treatment in the dogs.

Pavletic (1990) grafted a skin flap (pedicle graft) that was a partially detached segment of skin and subcutaneous tissue which includes a blood supply essential to its survival. These grafts were capable of closing a variety of defects, including poorly vascularised wound beds incapable of maintaining free grafts. In many cases, he found that skin flaps can bypass economically many of the potential problems associated with healing by second intention.

Studdert and Hughes (1991) evaluated a topical preparation containing miconazole, polymyxin and prednisolone in the treatment of otitis externa in 167 dogs than 2 other ear preparations containing antibiotics, an antimycotic and a corticosteroid. With miconazole, polymyxin and prednisolone, the recurrence rate was 26.7% compared with 72.6% and 54.3% when the other products were used and mean duration of treatment required to achieve resolution of clinical signs was
9.6 days, compared with 12.2 days and 13.0 days and no cases failed to respond to treatment, compared with 17.7% and 14.3%. *Malassezia canis* alone (71%) or in association with bacteria (18%) was recovered from 44 of 49 ears cultured.

Uchida *et al* (1992) inoculated intra auricularly with *Malassezia pachydermatis* in 8 Beagles to induce acute otitis externa. The affected animals showed the symptoms of otitis externa. All ear canals were erythematous and the dogs were shaking their heads. The clinical signs of otitis externa were reduced after treatment with 0.1 ml (per canal) of 1% pimaricin suspension twice a day for 3 days.

Beardsley and Schrader (1995) reviewed medical records of 98 dogs with wounds of the limbs caused by shearing forces (shearing wounds) that were reported most often in young dogs of many breeds, and most often resulted from trauma received during an automobile accident. Wounds were located mainly on the distal portion of the limbs, with the most common site being the medial aspect of the tarsus and metatarsus. All injuries resulted in exposure of subcutaneous soft tissues, about 3/4 of all injuries resulted in bone or joint exposure, and slightly more than 1/2 of the dogs had joint instability. All wounds were lavaged and debrided. Wounds were sutured, using primary closure techniques or methods that allowed the wound to remain partially or totally open to heal by second intention. Bandages were applied in all dogs. Most bandages were reinforced with a splint device.

Duijkeren (1995) studied the pathogenesis, diagnosis and therapy of anal sac impaction and sacculitis and suggested that the colour and consistency of the anal sac contents were variable in healthy dogs and there were no pathognomonic signs of anal sac impaction or sacculitis.
The wide variation in macroscopic details of anal sac secretions may give rise to misinterpretation and thus over diagnosis of sacculitis. He also suggested that further research was necessary on the morphological, physical and biochemical aspects of the anal sacs and their secretions to define more precise criteria for the diagnosis of anal sac impaction and sacculitis.

Fox et al (1995) examined a male Doberman Pinscher for multiple subcutaneous abscesses on the neck, trunk, and limbs that developed 2 months after a dog bite. Lesions resolved after 8 months of treatment with doxycycline (5 mg/kg of body weight, PO, q 12 h). The cause of dissemination was unknown; However, delay in debridement of the bite wound and corticosteroid use in initial wound management may have potentiated dissemination.

Rosenbaum and Kerlin (1995) studied erythema multiforme major and disseminated intravascular coagulation developed in a dog 24 hours after exposure to a d-limonene-based insecticidal dip. The clinicopathologic abnormalities included leukocytosis with neutrophilia, normocytic normochromic anemia, thrombocytopenia, prolongation of prothrombin and partial thromboplastin time, increased fibrin degradation products, hypoproteinemia, hyponatremia, hypochloremia, azotemia, high serum alanine aminotransferase and alkaline phosphatase activities, and high serum bilirubin concentration.

Smith et al (1995) treated 8-year-old miniature schnauzer with full thickness skin necrosis over most of the back, due to chemical burn. Management consisted of debridement, bandaging, hyperbaric oxygen therapy, and topical application of tris-EDTA and oral administration of antimicrobials. They created pedicle from the greater omentum, used to fill
the wound and provide a vascular bed for a full thickness meshed skin graft. Despite epidermal loss from the majority of the graft, the wound healed with acceptable appearance and function.

A new, effective drug combination for the therapy of canine otitis externa has been developed by Kiss et al (1997) with ketoconazole as antimycotic active ingredient, along with gentamicin sulphate and mazipredone hydrochloride. A total of 210 dogs affected with otitis externa were treated with this combination. They found that 94.2% of the treated dogs became clinically symptomless in an average of 8.5 days.

Nuttall (1998) treated 12 dogs with purulent and proliferative otitis externa. In all cases, the vertical and horizontal ear canals were inflamed and thickened, with ruptured tympanic membranes in 4 cases. Treatment was initiated with 1 to 2 mg/kg prednisolone orally once daily, and a cleansing and drying ear cleaner followed by topical administration of injectable ticarcillin solution 4 times daily. Cases with ruptured tympanae also received ticarcillin (15 to 25 mg/kg) 3 times daily intravenously until the membranes had healed. Repeated flushing of ear with saline was done until no further discharge was evident. Topical ticarcillin and the ear cleaner were continued twice daily for 14 days after clinical resolution. The duration of treatment ranged from 14 to 36 days.

Sylvestre (1998) examined 60 dogs that had a resection of the lateral wall of the vertical ear canal (Zepp’s method). The surgical outcomes were evaluated in association with the variables viz. breed, sex, age of onset of the otitis externa, duration of the disease before the surgery was performed, and treatment received for the otitis externa, the status of the ear and tympanic membrane at the time of the surgery, the culture results, and concurrent medical problems. The outcome of surgery
was acceptable in 45% and unacceptable in 55% of the cases. Breed was the only factor that could be correlated with the outcome. The procedure failed in 86.5% of the Cocker spaniels. When surgical outcomes in breeds other than Cocker spaniels were evaluated, 63% were acceptable and 37% were unacceptable. Sharpeis were found to have an ear canal of small diameter compared with that of other breeds and a tendency to have better outcomes.

Werner and Russell (1999) applied antibiotics to the skin formulated in a base that is nonirritant and nontoxic and have a narrow or fairly wide spectrum of activity but should produce no local reaction or sensitization, the commensal flora should not be affected unduly were fusidic acid, mupirocin and bacitracin, all of which have a narrow antibacterial spectrum. When applied to intact skin, fusidic acid penetrates more rapidly than other antibiotics. Clinically, the frequency staphylococcal resistance to it and to mupirocin has remained low. Fusidic acid and mupirocin have been recommended for the treatment of acute staphylococcal skin lesions.

White (1999) examined a 9-year-old, spayed female crossbred dog sustained a traumatic skin lesion to the right proximal pelvic limb, extending to the extensor surface of the stifle. Surgical management of the wound included primary closure using a body skin flap fashioned from the right caudolateral abdominal wall. To achieve closure and prevent tension on the wound, the coxofemoral and stifle joints on the affected immobilised in flexion. Flexion immobilisation of the stifle was achieved using the anatomical principle of muscle reciprocation. The fixator was removed 6 weeks postoperatively when the wound had healed.
Griffin (2000) reviewed that bite wounds were a frequent injury in dogs. Some bites were severe, causing crushing, avulsion, and devitalisation of tissues beneath the skin. Bites can also crush the airway or penetrate the abdominal or thoracic cavities, resulting in life-threatening injuries. He also reviewed the local mechanisms of trauma and systemic mediators involved in severe bite wound injuries and provides a plan for stabilisation, injury assessment, and definitive bite wound management.

Dye et al (2002) used the carbon dioxide (CO₂) laser for the treatment of 10 cases of aural hematomas in 8 dogs and evaluated the cosmetic results following CO₂ laser surgery as excellent in 3, good in 5, and fair in 2. Hematomas were resolved in all 10 cases, although 2 cases developed serosanguinous fluid accumulation that required percutaneous drainage in one case and a 2nd laser procedure in the other case.

Hill and Smeak (2002) performed sacculectomy by a closed technique in 57 dogs and an open technique in 38 dogs in which only 3 dogs developed short-term complications (excessive drainage, scooting and inflammation, and seroma formation), and 14 developed long-term complications (continued licking of the surgery site, faecal incontinence, fistulation, and stricture formation). Development of postoperative complications were significantly associated with surgical technique. They suggested that anal sacculectomy was a safe and effective treatment for non-neoplastic anal sac disease in dogs associated with a low rate of complications. The standard open technique was associated with the greatest number of complications, whereas complication rates for the closed and modified open techniques were similar to each other.

Sumano et al (2002) conducted a clinical trial using electrical stimulation for healing wounds in 44 dogs of different breeds and ages.
Lesions were graded into 3 categories according to severity and were treated by electrical stimulation with supportive therapy given only if an underlying disease was present. These wounds, previously treated conventionally without success, showed marked improvement. Only 3 (6.8%) patients had an outcome graded poor, 4 (9.1%) were graded fair, and 37 (84.1%) healed excellently. A positive correlation ($r = 0.98$) was found between severity of lesion and number of treatments needed. On the basis of trial they suggested that electrical stimulation was highly effective in promoting wound healing.

Hutchings (2003) treated 8-week-old, male Labrador Retriever for acute onset of left hind limb lameness which progressed to juvenile cellulitis, also characterised by dermatitis of the face, otitis externa, regional lymphadenopathy, lethargy, and depression. The puppy made a full recovery on glucocorticoid therapy.

Genierea et al (2004) evaluated the in vitro activity of orbifloxacin against *Staphylococcus intermedius* strains isolated from canine skin and ear infections. The minimum inhibitory concentrations (MICs) of orbifloxacin against 240 field *S. intermedius* isolates (69 skin and 171 ear isolates) ranged from 0.016 to 8 mg l$^{-1}$, with MIC$_{50}$ and MIC$_{90}$ equal to 0.5 and 1 mg l$^{-1}$, respectively. Only 1 strain, a pyoderma isolate was found resistant (MIC=8 mg l$^{-1}$). Orbifloxacin expressed a concentration-dependent bactericidal activity against the *S. aureus* reference strain, but a time-dependent bactericidal activity against *S. intermedius*.

Holm et al (2004) investigated correlations among clinical pyotraumatic dermatitis, histopathology of the lesions and possible predisposing causes. The relationship of these with breed, age, sex and location of lesion was assessed statistically. A clinical diagnosis of acute
pyotraumatic dermatitis was made in 44 dogs. Males exceeded females (P = 0.0348) and lesions were more common in dogs aged 4 years or less (P < 0.0001). Out of 14 breeds represented, Rottweiler, German shepherd dog and Golden Retriever were most common. There was no significant seasonal incidence and no correlation among site of lesion and cause, time of year, age or sex. Acute folliculitis was seen in 20 cases. However, no correlation was seen among age, sex, breed, underlying cause or site of lesion and histopathology.

Cobb et al (2005) evaluated the efficacy of a topical preparation containing 0.5% fusidic acid and 0.1% betamethasone-17-valerate compared to a systemic therapy comprising a combination of parenteral dexamethasone and oral clavulanate-potentiated amoxycillin in the treatment of 104 dogs with acute moist dermatitis. Significant improvement was evident after 7 days in both treatment groups in all clinical parameters assessed and there was no significant difference in the overall response between the 2 treatment groups.

Bassett et al (2005) diagnosed canine juvenile cellulitis in an 8-month-old, crossbred dog, with a painful, swollen face. The problem was of 4 weeks duration and had not responded to antibiotics. Complete resolution occurred with glucocorticoid therapy.

Emms (2005) recorded a retrospective study of anal sac tumours without pulmonary metastases, for the period July 1989 to July 2002, to establish the response to treatment with surgery and melphalan chemotherapy. Study suggested that there was a role for melphalan in the treatment of dogs with anal sac adenocarcinoma when combined with cytoreductive surgery, with treatment. Survival time and the local
recurrence rate of the primary tumour comparing favourably with previously published treatment regimes.

Mendelsohn et al (2005) evaluated the efficacy of topical amino acid-complexed zinc gluconate formulated with boric acid (ZGB) or acetic acid (ZGA) versus a topical placebo in the treatment of yeast otitis externa in dogs. Ears were treated with the placebo, ZGA, or ZGB medications. ZGB significantly reduced the number of yeast organisms in cases of otitis externa.

Rougier et al (2005) compared efficacy and tolerability of a marbofloxacin-clotrimazole-dexamethasone otic suspension (MCD) with a standard topical treatment in 140 dogs with clinical signs of acute or subacute otitis externa. Group 1 received MCD once daily while 2nd group received Surolan (containing polymyxin B, miconazole and prednisolone) twice daily for 7 or 14 days. The efficacy and tolerability were evaluated on days 7 and 14 that demonstrated equivalence of both treatments in terms of efficacy, with a cure rate of 58.3% for MCD and 41.2% for Surolan. Both medications were equally well tolerated by dogs, but MCD was found superior in terms of response rate, pain relief, decrease in pus quantity and smell.

Bensignor and Grandemange (2006) examined 20 dogs with otitis externa in both ears and numerous Malassezia species yeasts. These were treated in one ear with a combination product containing clotrimazole, marbofloxacin and dexamethasone, and in the other ear with a topical antifungal containing miconazole. The effects of the treatments were analysed on the basis of the scores for pruritus, erythema and amount of cerumen, but the combination product gave significantly greater reductions in erythema, cerumen and pruritus.
Itoh et al (2006) diagnosed erythema multiforme in a 5-year-old female Border collie with erythematous skin lesions at the axillae, groin, mucocutaneous junctions, and pinnae and by gross and histological examination. The condition was resolved by treatment with azathioprine, prednisolone, and a hypoallergenic diet.

Pavletic and Trout (2006) reviewed the diagnosis and therapeutic options in dogs with bullet, bite, or burn trauma. They found that injuries can vary from simple minor penetrating skin wounds to major life-threatening soft and hard tissue damage with concurrent complex metabolic ramifications.

Reme et al (2006) evaluated a new antimicrobial ear cleanser for the treatment of bacterial and yeast ear infection in 45 dogs with erythematoceruminous or purulent otitis externa randomly allocated to 2 treatment groups i.e. reference ear cleanser (Epiotic, Virbac) or test ear cleanser (Epiotic Advanced, Virbac). Ear cleansing was performed twice daily for 2 weeks, and no other treatment was allowed. By week 2, clinical (exudate quantity, erythema, stenosis, excoriation, and odor) and discomfort (pain, ear scratching, and head shaking) scores were significantly decreased (P < .0001 for all) and no microbial overgrowth could be detected in 25 (64.1%) and 32 (68.1%) ears treated with Epiotic and Epiotic Advanced, respectively. The new pH-balanced, propylene glycol-free test ear cleanser, which incorporates microbial adhesin-blocking carbohydrates, proved to be an effective ear cleanser as the reference acidic formula.

Blattler et al (2007) reported that aural haematomas occur commonly in dogs with the predisposing factors trauma to the pinna, violent head shaking, and acute or chronic otitis externa. Treatment
usually involves invasive surgery performed under general anaesthesia but these techniques can create wounds requiring intensive aftercare. They suggested and used fibrin sealants for the first time to canines to successfully treat aural haematomas in canines.

Harris and Dhupa (2008) evaluated the effectiveness of scrotal tissue as an autogenous free skin graft to treat cutaneous degloving injuries of the distal limb in 2 dogs. First dog had a tarsal degloving wound with exposure of the distal tibial and tarsal bones while the 2nd dog had a degloving injury over the metacarpals. Wounds were treated with daily wet-to-dry bandages in order to develop a healthy bed of granulation tissue at the graft recipient site. Scrotal ablation castration was performed once the recipient site had been prepared. Subcutaneous and adipose tissue were excised from the scrotal graft and mesh slits were created. The graft was applied to the recipient site with monofilament absorbable simple interrupted sutures. Follow-up was performed at 30 days. In dog 1, the tarsal degloving injury graft had 1st intention healing with 100% graft take on day 11 while in dog 2, the metacarpal degloving injury graft had 90% graft take on day 9, with 2nd intention healing adjacent to the 5th digit pad. They reported that the scrotum has been a viable option as a full thickness mesh free graft for distal extremity reconstructive surgery.

MacPhail (2008) described that removal of the anal sacs has been a frequently performed surgery in dogs most often indicated as definitive treatment of chronic anal sacculitis. He suggested that the anal sacs were intimately associated with the external anal sphincter; therefore, faecal incontinence resulting from damage to external anal sphincter muscle or its innervation has been a potential complication of anal saccullectomy. Fistula formation and incisional infection were other possible complications.
Rooster and Declercq (2008) reported the clinical use of honey dressings in several clinical cases of skin wounds in dogs. The findings confirm that wounds which were treated with honey heal quickly. The bacterial contamination was well controlled, debridement was effective and the dressings were well tolerated in all patients.

Six et al (2008) evaluated the efficacy and safety of administration of cefovecin, compared with cefadroxil, for treatment of naturally occurring secondary superficial pyoderma, abscesses, and infected wounds in dogs with clinical signs of skin infection confirmed via bacteriologic culture which were randomly allocated to receive a single SC injection of cefovecin (8 mg/kg) followed by placebo administered PO twice daily for 14 days or cefadroxil (22 mg/kg) administered PO twice daily for 14 days following a placebo injection. Two 14-day treatment courses were permitted. At the final assessment, 14 days following the completion of treatment (on day 28 or 42), 92.4% (109/118) of the cefovecin group and 92.3% (108/117) of the cefadroxil group were treatment successes. They found that clinical efficacy achieved with cefovecin was equivalent with that of cefadroxil in average.

Spugnini et al (2008) described canine anal sac gland carcinoma (ASGC), a frequently neoplasm which was highly aggressive and can frequently lead to metastatic spread and treated an incompletely excised ASGC by using cisplatin selectively driven within the tumour cells by trains of biphasic pulses. The dog received 2 courses of electro chemotherapy 14 days apart. Neither systemic nor local toxicities were detected during the whole course of therapy. The dog was still in complete remission after 18 months. Electro chemotherapy was a safe and efficacious adjuvant therapy for ASGC.
Elina and Virve (2009) examined the puppy with extensive burned areas affecting approximately 15% of the total body surface area on the left side of the head around the eye and ear, the neck, left scapula, and the dorsal thoracic region with the most severe and deepest lesions over the back. They found history of the burn injury mechanism was consistent with the resultant burn pattern observed.

Yoshihiko (2009) treated vulvar abscess in a 3-year-old, female Miniature Dachshund with soft swelling on the left vulva as well as a solid mass with approximately 2 cm in diameter palpated in the deep soft tissue around the vaginal wall. Pus-like fluid was aspirated from the swelling. Therapy consisted of incision and drainage of the swelling to remove the pus. In addition, the mass in the deep soft tissue was removed surgically using semiconductor laser surgical unit. The skin lesions were completely cured at 10 days after the surgery.

Brown (2010) discussed that aural haematomas occur when blood vessels in the pinna rupture secondary to trauma or excessive head shaking. Blood fills the space between the skin and the cartilage, causing pain and potential deformity of the ear and also discussed surgical treatment of aural hematomas in the dog.

Dryden (2010) studied skin and soft tissue infections (SSTIs) were common, complicated SSTIs (cSSTIs) and more extreme accompanied with ischaemia, tissue necrosis, burns and bites that were managed by prompt recognition, timely surgical debridement or drainage, resuscitation and appropriate antibiotic therapy. The mainstays of treatment were the penicillins, cephalosporins, clindamycin and co-trimoxazole. β-Lactam / β-lactamase inhibitor combinations were indicated for polymicrobial
infection. A range of new agents for the treatment of methicillin-resistant *S. aureus* infections include linezolid, daptomycin and tigecycline.

Mohsin (2010) conducted a study on 15 dogs of either sex and aged between 2-3 year of different breed showing unilateral or bilateral ear haematoma. The surgical treatment was done by making a longitudinal incision on in entire length of haematoma. After draining the blood or serum and cleaning the debris, haematoma pocket was flushed with saline or weak tincture iodine. Horizontal interrupted mattress sutures were placed parallel to the incision and the pinna was dressed with antiseptic and bandaged with compression bandage.

Mullally *et al* (2010) treated a burned 1-year-old female intact American Staffordshire Terrier with 50% total body surface area. The dog was treated with crystalloid fluids, hydroxyethyl starch, and antimicrobials based on culture and sensitivity results of wound cultures, fresh frozen plasma, human serum albumin, and packed red cells. Wound care initially consisted of daily debridement under anaesthesia with silver sulfadiazine application and bandaging. Because of the pain caused by vacuum-assisted closure and traditional bandaging techniques with this extent of injury, a nanocrystalline silver dressing was utilised which had antimicrobial properties and reduced necessity for daily bandage changes.

Nevill (2010) treated a 10-year-old Greyhound-cross dog with a large, chronic skin wound extending over the interscapular region. The substantial skin defect was closed by making use of bilateral axillary skin fold flaps. Small dorsal areas of the skin flaps underwent necrosis, but the resulting defects were closed without difficulty in a subsequent procedure.

Nussbaum and Courtney (2010) successfully conducted for a foreign body removal surgery to retrieve bullet fragments in a 4-year-old
dog on its right cheek, ventral to the zygomatic arch, a large focal swelling was present with a small visible draining tract. A partially zygomectomy was performed to gain sufficient access to the location of the foreign bodies. A Penrose drain was placed in the abscess to facilitate drainage and healing. The surgical wound healed and the abscess and draining tract resolved.

Park et al (2010) diagnosed juvenile cellulitis in 7-week-old, 3 English Cocker Spaniel littermates with concurrent neurologic signs based on history, histopathology, and therapeutic response. The puppies were treated with cyclosporine and prednisolone. Skin lesions and hindlimb paresis improved following treatment.

Dunn et al (2011) presented 3 dogs for the management of disease processes resulting in large skin defects viz. severe dog bite, large burn wound sustained from heating pad and myxosarcoma over the dorsal lumbosacral region. In each case, the extent and location of the resulting skin defect were assessed as factors likely to prevent reconstruction using simple tension-relieving techniques alone or in combination with established reconstructive techniques, such as axial pattern flaps or skin stretching devices. Bilateral skin fold rotation-advancement flaps (SFRAFs) based on the flank folds were mobilised dorsally and allowed complete wound closure in 2 dogs and subtotal closure in the other dog. All wounds healed without major complications and an acceptable cosmetic outcome was achieved in each case. The use of bilateral SFRAFs was a useful technique alone or in combination with other reconstructive techniques for the closure of large dorsal lumbosacral skin defects.
Florin et al (2011) discussed aural haematoma was clinically represented by the presence of collection within cartilage plate of the ear, that were initially fluid, soft, fluctuating, but later become more firm and reduce in size and volume due to resorption and fibrosis. Several techniques have been described for surgical treatment of ear hematomas. The most common procedure was incision of the parietal tissue of hematoma, evacuation of blood clots, fibrin and to fix cartilage until scar tissue formation.

Smeeak (2011) recommended total ear canal ablation combined with bulla osteotomy as a salvage procedure primarily for end-stage inflammatory ear canal disease but also for neoplasia and severe traumatic injuries. Due to the complexity of the procedure and the poor exposure associated with the surgical approach, there has been a significant risk for a variety of complications.

Usui et al (2011) treated otitis externa in 27 Toy Poodles and 40 Miniature Dachshunds using a video otoscope and observed distinct concavity at the junction between the ventral part of the external surface of the tympanum and the ear canal to which a considerable amount of hair and debris had adhered were removed, and systemic antibiotic and antifungal agents were administered, after which all the dogs recovered.

Bowlt et al (2013) studied anal sac gland carcinoma arising from the apocrine secretory epithelium in the anal sac wall, was locally invasive and highly metastatic. The majority of anal sac gland carcinomas were unilateral on presentation, but bilateral tumours have also been identified. They presented the outcome of 4 unique cases of unilateral anal sac gland carcinoma which subsequently developed contralateral anal sac gland carcinoma 50 to 390 days after removal of the initial tumour. Median
survival was 1035 days after initial diagnosis and 807 days after diagnosis of the 2nd anal sac gland carcinoma.

Eyarefe et al (2013) studied dogs with aural hematoma that was incised, drained and the pinna packed over cotton padded hard core as auricular pillow and supported with a non-adherent compression bandage over the head for 7-12 days. The pinna healed with least scarification and restored morphology. They suggested that the auricular pillow method of aural hematoma management could be a better approach to the management of aural hematoma.

Kurach et al (2013) conducted facial reconstructive surgery in a 6-year-old, female, mixed-breed dog after traumatic amputation of the rostral aspect of the muzzle and the nasal planum and the rostral portion of the upper lips were missing. A hard palate mucoperiosteal flap and lateral labial advancement flaps were used to reconstruct the nasal philtrum and borders of the nares. This reconstructive technique resulted in adequate nostril function and an acceptable cosmetic outcome.

Mason et al (2013) tested antimicrobial activity of 9 ear cleaners against 50 *M. pachydermatis* isolates from 49 clinical cases of canine otitis externa using an *in vitro* agar diffusion test. There were statistically significant differences in activity between ear cleaners, with 5 showing excellent *in vitro* anti-Malassezia activity (CleanAural Dog®, Epi-Otic®, MalAcetic Aural®, Sancerum® and TrizUltra™ + Keto), 2 moderate activity (Otodine® and Surosolve®), 1 variable activity (Otoclean®) and 1 no activity (Cerumaural®). There was a significant overall difference in susceptibility between *M. pachydermatis* isolates tested (P < 0.001). Ear cleaners with activity against *Malassezia* may help to reduce the unnecessary use of antibiotic-containing polypharmaceutical ear
medications.

Mukesh et al (2013) diagnosed acute moist dermatitis in a 1.5 year old, male German Shepherd dog on the basis of history, clinical examination of lesion and bacterial culture and sensitivity test. Surgico-therapeutic management was done with topical Caladryl lotion, injection of anistamin, prednisolone, meloxicam and oral amoxicillin clavulanic acid. Successful recovery was recorded in 10 days.

Narasimha and Shwetha (2013) examined a black Mongrel male dog aged 5 years with loss of hairs and biting at right lateral thigh region. Clinical examination revealed erythematous, swollen, alopecia and exudative area and the condition was diagnosed as acute moist dermatitis. The animal was treated with oral and topical antibacterials and the condition recovered completely after 2 weeks.

Pietschmann et al (2013) studied to elucidate the in vitro activity of polymyxin B and miconazole against clinical bacterial isolates to investigate possible differences in sensitivity and to assess drug interactions. The 17 strains of Escherichia coli, 24 strains of Pseudomonas aeruginosa, 24 strains of Proteus mirabilis and 25 strains of Staphylococcus pseudintermedius has been isolated from dogs with otitis externa. In vitro synergy of polymyxin B and miconazole against E. coli and P. aeruginosa isolates indicates a rationale for applying both agents in combination to treat otitis externa when infected with these types of bacteria.

Ayman et al (2014) evaluated the efficacy of Aloe Vera (AV) gel in the treatment of deep 2nd degree burn wounds and compare its results with those of silver sulfadiazine (SSD) in dogs. The efficacy of treatment was assessed based on the healing percentage of the wound, time to
complete wound healing and the degree of inflammation and exudation. Wound contraction was higher in the AV group than both SSD and the control group. Clinically, inflammatory reaction and exudation were less in AV group than the SSD and control group. They suggested that use of topical AV gel accelerate healing process in burn wound.

Charlesworth (2014) studied anal sacculectomy in 62 dogs in which 32.3% developed mild and self-limiting complications including 14.5% dogs that experienced postoperative defaecatory complications. No dog developed permanent faecal incontinence. He found that anal sacculectomy is a safe procedure with a relatively high rate of short-term but self-limiting, minor, postoperative complications. He further stated that smaller (<15 kg) dogs are more likely to experience postoperative complications but the risk of permanent faecal incontinence is low.

Chiavassa et al (2014) compared the in vitro antifungal susceptibility of M. pachydermatis isolates obtained from chronic and acute cases of otitis externa. The aim was to assess the possible onset of resistance mechanisms in isolates involved in long-lasting episodes with poor response to treatment and evaluated the in vitro susceptibility to miconazole (MCZ) and clotrimazole (CTZ) of 42 isolates of M. pachydermatis obtained from dogs with chronic (group A, n = 25) and acute otitis (group B, n = 17), using a modified CLSI M27-A3 microdilution method. All isolates were inhibited by the antifungal agents employed, but Malassezia isolates from group A were significantly associated with higher minimum inhibitory concentration (MIC) values for both agents (Median MIC values: MCZ group A 2 µg/ml, group B 1 µg/ml; CTZ group A 8 µg/ml, group B 4 µg/ml). The study suggested that isolates of M. pachydermatis involved in chronic cases of canine external otitis and exposed to repeat
antifungal treatments were unlikely to develop mechanisms of resistance of clinical relevance.

Gyorffy and Szijarto (2014) treated aural haematoma either by surgical or by conservative treatment. The haematoma was opened, cleaned surgically and the 2 layers of the auricular cartilage were appositioned inside with several suture lines placed on both sides of the incision, alternating the sides approaching to the sagittal cavity. None of the suture lines was stitched through the auricle completely as they all run intradermally on the side of the haematoma and to the cartilage on the other side. The new method offers a minor risk of postoperative complications while accomplishing high healing rates.

Kathryn et al (2014) reported experience with negative pressure wound therapy (NPWT) in 45 consecutive dogs admitted with extensive cutaneous wounds which were largely traumatic in origin, and distributed fairly evenly to the trunk, proximal and distal aspects of the limbs and to determine its feasibility. Most wounds (33; 62%) were closed surgically after NPWT and were healed by 14 days. They found that 2nd NPWT was applicable to a wide variety of canine wounds, it was well tolerated and can be used to optimise the wound bed for surgical closure or 2nd intention healing.

Sue (2014) reported that acute moist dermatitis has been a common dermatological condition seen in both dogs and cats. Although, most cases respond quickly and completely to symptomatic therapy, it is still important to assess each animal on an individual basis and undertake a few quick basic diagnostic tests on each one in order to prescribe the most appropriate therapy.
Banovic et al (2015) described canine toxic epidermal necrosis (TEN), a rare and life-threatening cutaneous drug reaction, as full-thickness devitalisation of the epidermis with minimal dermal inflammation and characterised the clinical features and histologic variations of 3 canine toxic epidermal necrosis patients. Clinically, irregular erythematous and purpuric macules evolved into widespread and severely painful erosions. Although, the number of eroded mucosae varied frequently, periocular and perilabial mucocutaneous junctions were affected.

Lee and Simpson (2015) diagnosed degloving injury in Hunter with abrasions on lateral and medial aspects of right limb antebrachium and right lateral thoracic region. The wound was lavaged and a haemoclip was placed on the bleeding arterial vessel. A wet-to-dry bandage was placed using the VAC system using intermittent settings of 125 mmHg with 5 minutes on and 2 minutes off and the patient was started on Baytril 10 mg/kg IV q24h and Unasyn 30 mg/kg IV q8h. The VAC system was removed 2 days later and superficial debridement was performed. Non-adherent dressings were placed on all wounds and covered with a modified RJ bandage.

Pavletic (2015) treated the aural hematomas surgically from the convex, or lateral, pinnal surface. Two small incisions were used to position a vacuum drain into the incised haematoma cavity. The free end of the drain was attached to a vacuum reservoir for 18 to 21 days. All hematomas resolved and surgical sites healed during the minimum 6-month follow-up period. Cosmetic results were considered excellent in 4 of 5 patients. However slight wrinkling of the pinna in 1 patient resulted from asymmetric enlargement of the cartilaginous walls of the haematoma, where vacuum application resulted in a slight folding of the redundant lateral cartilage wall.
MATERIALS AND METHODS

In present study, 36 dogs of either sex, different breed and age groups with dermatological emergencies were included that reported from April 2015 to September 2015.

All the dogs were diagnosed and treated in the Surgery clinic of Teaching Veterinary Clinical Complex (TVCC), RAJUVAS, Bikaner and department of Veterinary Surgery and Radiology CVAS, Bikaner.

**Chemicals, reagents used for haemato-biochemical evaluation**

The laboratory facilities of TVCC, RAJUVAS, Bikaner and department of Veterinary physiology were used for the study.

Collection of blood – syringes, EDTA, collection vial

**Haematological examination**

Haemoglobin - N/10 HCl, Sahli’s haemoglobinometer

PCV – microhaematocrit capillary tubes, blocking wax.

TEC – RBC diluting fluid, RBC pipette, Neubauer counting chamber.

TLC – WBC diluting fluid, WBC pipette, Neubauer counting chamber

DLC – Slide, methanol, Giemsa stain, cedar wood oil, light microscope with oil immersion lens

Platelets – Platelet diluting fluid

**Biochemical examination**

The quantitative estimation of biochemical parameters were performed using standard colourimetric kits for the following parameters

Aspartate aminotransferase (AST) – Colourimetric kit (Biolab*).
Alanine aminotransferase (ALT) – Colourimetric kit (Biolab*).
Alkaline phosphatase (ALP) – Colourimetric kit (SPAN*).
Total Protein (TP) – Colourimetric kit (Labcare*).
Serum urea nitrogen (SUN) – Colourimetric kit (Biolab*).
Serum creatinine – Colourimetric kit (Biolab*).
Transferrin saturation – 2, 2-Bipyridil reagent (CDH*), Chloroform.

**Surgical materials and medicines used for surgico-therapeutic management**

**Surgical materials**

Autoclaved general surgical pack, Bard-Parker blade no. 20, absorbable and non-absorbable suture materials e.g. Mersilk No. 1, chromic catgut no. 1/0, clinical spirit, bandages, surgical antiseptic dressings, Elizabethan collar.

**Medicines**

The following broad spectrum antibiotics, broad spectrum antifungal drugs, non-steroidal anti-inflammatory drugs, topical broad spectrum antibiotics, topical non-steroidal anti-inflammatory drugs, topical corticosteroid, ear cleaner solutions, topical ointments, topical antiseptics and multivitamin supplements were used in animals of present study-

**a) Antibiotics and Antifungal preparations**

- Ceftriaxone @ 15-25 mg/kg BW I/M, I/V (Intacef-Intas*)
- Amoxicillin + Sulbactum @ 10-20 mg/kg BW I/M (Amoxirum forte-Glaxo*)
- Clindamycin hydrochloride @ 11 mg/kg BW P.O.(Bioclan-Savavet*)
- Cephalexin @22-30 mg/kg BW P.O. (Lixen-Virbac*)
• Cefpodoxime proxetil @ 5-10 mg/kg BW P.O. (Cefpet-Intas*)
• Enrofloxacin @ 5-20 mg/kg BW P.O. (Ataxin-Savavet*)
• Marbofloxacin @2 mg/kg BW P.O. (Marbomet-Intas*)
• Itraconazole @ 5-10 mg/kg BW P.O. (Intrasys-Systopic*)
• Ketoconazole @ 10 mg/kg BW P.O. (Nizoral-Jannsen Cilag*)

b) Anti-inflammatory preparations

i) Nonsteroidal anti-inflammatory drugs
• Meloxicam @ 0.2 mg BW I/M (Melonex – Intas*)

ii) Steroidal anti-inflammatory drugs
• Prednisolone acetate @0.5 mg/kg BW I/M (Intervet India Private Ltd.*)
• Dexamethasone sodium phosphate @0.5-2 mg I/M (Total dose) (Zydus AHL*)

iii) Others
• Cyclosporine @ 5-10 mg/kg BW P.O. (Atopex 50 – Cipla*)

c) Topical preparations (Antibiotics / Antifungals / Antiseptic)

• Gentamicin, dexamethasone (Gentacort-D ear drop – Laborate*)
• Ciprofloxacin (CIPLOX ear drops – Cipla*)
• Ofloxacin, clotrimazole, betamethasone dipropionate, lignocaine hcl (Pomisol ear drop – Intas*)
• Chloramphenicol, beclometasone dipropionate, clotrimazole, lignocaine HCl (Eargesic ear drop – PCI*)
• Povidone iodine: containing 5% Povidone iodine w/w (USV*).
- Chlorhexidine gluconate (0.3%), cetrimide (3%) (Savlon liquid-ITC*)
- Coumphants (3%), Propoxur (2%), Sulfanilamide (5%) powder (Negasunt: Bayer*)
- Clobetasol propionate 0.025%, ofloxacin 0.1%, miconazole nitrate 2.0%, zinc sulphate 3.0% - (Kiskin-Intas*)
- Mupirocin – 2% (Supiroban-Glenmark), (Staphban-Savavet*)
- Holy Basil (Tulasi), Zinc (Yashad Bhasma), Neem (Nimba), Turmeric (Haridra) - (Scavon-Himalaya*)

d) Ear Cleaner solutions
- Water, propylene glycol, lactic acid, Spherulites, docusate sodium, salicylic acid, PCMX, dimethicone, fragrance present in encapsulated (SPHERULITES) and free forms. Chitosanide is present in encapsulated form-(Epiotic –Virbac*)
- Hydrogen peroxide solution – 3% w/v

e) Laxatives
- Lactulose 3.335g/5ml P.O. (Duphalac – Abbott*).

f) Multivitamins
- Vitamin A, Vitamin D₃, Vitamin E acetate, Niacinamide, Thiamine hydrochloride, Pyridoxine hydrochloride, Riboflavin sodium phosphate, D-Panthenol, Vitamin B₁₂, D-Biotin, Calcium glycerophosphate, Phenol I/M (Multivet - Dosch*).
- Methylcobalamine, Pyridoxine HCl and Nicotinamide I/M (Neuroxin-M – Zydus AHL*).
Methodology

Selection of clinical cases

Dogs reported at surgery clinics of TVCC, RAJUVAS, Bikaner and Department of veterinary Surgery and Radiology, CVAS, Bikaner with signs of dermatological disorders were included in the study. Selection of animals was performed on the basis of collection of detailed history, predominant clinical signs and haematobiochemical observations.

History taking (anamnesis)

The signalment, age, breed, sex of the animal was recorded and the owner was asked in detail regarding the hair coat, diet, seasonal occurrence of disease, time of onset, present condition and progression of the ailment, occurrence of same disease in other dogs of same kennel if any, previous investigation and therapy, any disease or lesion in members of the family.

All the cases screened for dermatological emergencies underwent a thorough physical and clinical examination followed by routine haematobiochemical examination.

Clinical examination

A detailed and thorough clinical examination was carried out in dogs on the day of presentation and also in the follow up days, wherever feasible for pattern of hair loss, presence of skin lesion either primary or secondary, location of lesion, and, total area of body affected by the dermatological affection.

Various dermatological emergencies were diagnosed based on the presence of predominant clinical signs described as –
i) Acute otitis externa

Clinical examination revealed predominant clinical signs of head shaking, scratching at or under the ear, pain upon palpation of the tragus, inflammation, oedema, erythema-ceruminous discharge and dirt in ear canal.

ii) Wounds and lacerations

Clinical examination revealed bleeding injuries, swelling and oozing at the wounded area, hair loss and pain predominantly at forehead, neck, chest, ear, limbs, upper lip, and perineal region.

iii) Acute moist dermatitis

Clinical examination revealed signs of alopecia, acute folliculitis, swollen, pruritus, erythematous, exudative and plaque like area, often painful on palpation, crushing and matting of the hair present which appears suddenly with very rapid progression in female. The lesions are mainly located on the lateral aspect of face below the ear, posterior aspect of thigh and neck.

iv) Anal sac disease

Clinical examination revealed clinical signs of scooting across the ground, tenesmus, straining to defecate, foul discharge or pus, sacculitis, pain, biting or chasing the tail, malodorous discharge, swelling around the anal area and behavioral change. There may pain upon palpation perianal area or upon rectal palpation. The anal sacs may be swollen or a necrotic draining fistulous tract may be present.

v) Aural haematoma

Clinical examination revealed excessive ear scratching, head shaking and a consistent fluid-filled swelling on either all or just part of the ear pinna.
vi) Cutaneous foreign bodies

Clinical examination revealed moist, erythematous, swollen area upon close inspection of interdigital spaces and plantar surface of the paw and lameness during walk, licking and pain on palpation of affected part. There may be an open lesion, or draining tract.

vii) Juvenile cellulitis

Clinical examination revealed draining oedema, papules, pustules and crusts at facial mucocutaneous junctions, otitis externa, mucopurulent ocular discharge, lameness, regional lymphadenopathy and they may abscess and rupture, lethargy and difficulty during eating and swallowing due to pain.

viii) Cutaneous abscess

Clinical examination revealed hot, red, swollen, painful lumps and swollen lymph node and blood mixed pus. There may be draining punctured wound or a fluctuating swelling.

Haemato-biochemical evaluation

All the dogs of the present study affected with various dermatological emergencies underwent haemato-biochemical examination in order to evaluate the haemato-biochemical parameters.

i) Collection of blood

The venous blood samples were collected from the cephalic vein of the animals on the day of presentation in EDTA containing plastic tubes for haematological studies. For biochemical analysis, blood samples were collected in plain collecting vials or in sterilized syringes and the blood serum was separated and stored in deep freeze until used for biochemical tests.
ii) **Haemato-biochemical examination**

Haematological examination of the blood samples taken from dogs with various dermatological emergencies comprising of haemoglobin (Hb), packed cell volume (PCV), total erythrocytes count (TLC), total leucocytes count (TLC) and differential leucocyte count (DLC). These parameter were analysed as per the methods described by Jain (1986).

i. Haemoglobin (Hb) was measured by Sahli’s haemoglobinometer.

ii. Packed cell volume (PCV) was measured by microhaematocrit method.

iii. Total erythrocyte count (TLC) and total leucocyte count (TLC) were carried out on a haemocytometer (Neubaur’s counting chamber).

iv. Differential leucocyte count (DLC) was done from Giemsa stained blood smears.

v. Platelet count was measured by manual platelet count method using haemocytometer (Harrison et al, 2001).

Biochemical study of blood serum sample was performed for quantitative estimation of alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), total protein (TP), serum urea nitrogen (SUN) and creatinine were done in dogs using standard spectrophotometric methods. Transferrin saturation was measured from the ratio of serum iron concentration to total iron binding capacity (TIBC).

**Alanine aminotransferase (ALT)**

Serum Alanine aminotransferase was determined by spectrophotometric method described by King (1965).
The activity of enzyme is measured by the increase of pyruvate with time. After a fixed time the pyruvate formed from L-alanine and α2-oxoglutaric acid according to equation is determined colourimetrically by treating the 2, 4 dinitrophenylhydrazine with alkali.

**Aspartate aminotransferase (AST)**

Serum aspartate aminotransferase was determined by spectrophotometric method described by King (1965).

The activity of enzyme is measured by the increase of oxaloacetate with time. After a fixed time the oxaloacetate formed is determined colourimetrically by treating the 2, 4 dinitrophenylhydrazine with alkali.

**Alkaline phosphatase (ALP)**

Serum alkaline phosphatase was determined by spectrophotometric method described by King (1965).

The phosphate liberated on incubation of serum with buffered phenyl phosphate is used as an index of phosphate activity. A colour reaction is there as Folin and Ciocalteu can be recorded in the form of optical density.

**Total protein (TP)**

Total protein was determined by colorimetric method described by Lowry *et al* (1951). This test was based on a coloured reaction of amino acid tyrosine, constituent of protein with Folin-Ciocalteu. The amount of protein and colour intensity had linear relationship which can be recorded on a spectrophotometer at 660 µ wavelength.

**Serum urea nitrogen (SUN)**

Serum urea nitrogen was determined by diacetyl monoxime method of Natelson as described by Varley (1988). When urea is heated with diacetyl containing 2 adjacent carbonyl groups, coloured compound are
formed. The coloured intensity recorded as optical density by using distilled water blank at 480 µ wavelength in spectrophotometer.

**Serum Creatinine**

Serum creatinine was determined by the method of Bonsnes and Taussky described by Varley (1988). For determination of serum creatinine, prior precipitation of protein is required, and then reaction with alkaline picrate solution formed red coloured compound. The colour intensity is determined by using spectrophotometer at 500 µ wavelength.

**Transferrin saturation**

Transferrin saturation was measured from the ratio of serum iron concentration to total iron binding capacity (TIBC) described by Williams and Wikkins (2002).

The haemato-biochemical values of dogs with various dermatological emergencies were compared with standard reference values. Any alterations in these haemato-biochemical values were corroborated with the clinical diagnosis made thereof.

**3.3 Surgico-therapeutic management**

The diverse dermatological emergencies diagnosed in dogs of the present study underwent surgico-therapeutic management for the treatment employing various medicinal and surgical treatment regimens or a combination of surgical treatment along with supportive medicinal treatment, wherever feasible on the day of presentation and in the follow up treatment period.

The outcome of these various treatment regimens employed in dogs with various dermatological emergencies were assessed for the recovery in percentage as per the opinion of owner and the examiners observations.
RESULTS

In present study, 36 dogs of both sexes, different age groups and breed were reported with signs of dermatological disorders during April 2015 to September 2015.

The overall occurrence of dermatological emergencies was 17.14 % recorded in 36 out of total 210 cases of dogs. The sex wise incidence of dermatological emergencies was recorded as 61.11% in male (22/36) was higher than 38.89% in female (14/36) dogs (Table 1).

The highest incidence of dermatological emergencies was recorded as 30.56% in dogs of 1-3 years age group followed by 27.78% in 3-6 years age group, 25% in dogs less than 1 year age whereas, lowest incidence was recorded 16.67% in dogs more than 6 years age (Table 2).

The German shepherd breed has the highest incidence 33.33%, of dermatological emergencies followed by 25% in Labrador, 19.44% in non-descript and lowest incidence 2.78% each in Doberman, Saint Bernard, Dalmatian, Rottweiler, Bully, Spitz, Cocker Spaniel, and Neapolitan Mastiff (Table 3).

Based on the signalment and predominant clinical signs, various dermatological emergencies were diagnosed in dogs of the present study (Table 4).

Acute Otitis externa was reported in 13 dogs (5 male, 8 female). It has the higher incidence (36.11%) among all the dermatological disorders. Female dogs are more affected (61.54%) than male (38.46%). The incidence of wound and lacerations is (19.44%) was reported in 7 dogs (5
Table 1: Sex-wise incidence of dermatological emergencies in dogs

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Sex</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>No. of cases</td>
<td>22</td>
<td>14</td>
</tr>
<tr>
<td>Incidence (%)</td>
<td>61.11%</td>
<td>38.89%</td>
</tr>
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Table 2: Age-wise incidence of dermatological emergencies in dogs

<table>
<thead>
<tr>
<th>Particulars</th>
<th>&lt; 1 year</th>
<th>1-3 years</th>
<th>3-6 years</th>
<th>&gt;6 year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Cases</td>
<td>9</td>
<td>11</td>
<td>10</td>
<td>6</td>
<td>36</td>
</tr>
<tr>
<td>Incidence (%)</td>
<td>25%</td>
<td>30.56%</td>
<td>27.78%</td>
<td>16.67%</td>
<td>100%</td>
</tr>
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</table>

Table 3: Breed-wise incidence of dermatological emergencies in dogs

<table>
<thead>
<tr>
<th>Breed</th>
<th>No. of cases</th>
<th>Incidence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>German Shepherd</td>
<td>12</td>
<td>33.33%</td>
</tr>
<tr>
<td>Labrador</td>
<td>9</td>
<td>25%</td>
</tr>
<tr>
<td>Doberman</td>
<td>1</td>
<td>2.78%</td>
</tr>
<tr>
<td>St. Bernard</td>
<td>1</td>
<td>2.78%</td>
</tr>
<tr>
<td>Dalmatian</td>
<td>1</td>
<td>2.78%</td>
</tr>
<tr>
<td>Rottweiler</td>
<td>1</td>
<td>2.78%</td>
</tr>
<tr>
<td>Bully</td>
<td>1</td>
<td>2.78%</td>
</tr>
<tr>
<td>Spitz</td>
<td>1</td>
<td>2.78%</td>
</tr>
<tr>
<td>Cocker Spaniel</td>
<td>1</td>
<td>2.78%</td>
</tr>
<tr>
<td>Neapolitan Mastiff</td>
<td>1</td>
<td>2.78%</td>
</tr>
<tr>
<td>Non –descript</td>
<td>7</td>
<td>19.44%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>36</td>
<td>100%</td>
</tr>
</tbody>
</table>
male, 2 female). The male dogs has the higher incidence (71.43%) than female dogs (28.57%).

Acute moist dermatitis was reported in 4 dogs (3 male, 1 female) and anal sac disease in 4 male dogs. Both these dermatological emergencies have the 11.11% incidence each. The aural haematoma was reported in 3 dogs (2 male, 1 female) with 8.33% incidence. The male have higher incidence (66.37%) than female dogs (33.63%). The incidence of cutaneous foreign bodies and juvenile cellulitis was 5.56% each. These were reported in 2 dogs each, with the same incidence in male and female dogs. Lowest incidence of cutaneous abscess (each 2.78%) was reported in 1 male dog.

Haematobiochemical Evaluation

In present study, the haemato-biochemical values of these dermatological emergencies have been recorded and presented in tables 5 and 6, respectively.

Acute otitis externa

Out of 13 cases of acute otitis externa, the haematological values showed decreased Hb (range 8.6-9.6 g dL\(^{-1}\)) and PCV (range 26-32%) in 5 cases. There is marked neutrophilia (range 83-88%) recorded in all the cases. The TLC was found within normal range in all the cases except in 2 cases, it was recorded (15 and 16x10³µL\(^{-1}\)), found towards higher limit of normal reference range. TEC and platelet counts were found within normal reference range.

In biochemical examination, the ALT values (range 58.2-73.4 uL\(^{-1}\)) in 5 cases, ALP (range 103.5-109.7 uL\(^{-1}\)) in 4 cases and TP (range
78.2-82.2 gL\(^{-1}\)) in 4 cases were found increased than the normal reference range. The AST, serum urea and creatinine levels in all the 13 cases of acute otitis externa were found within normal reference range.

**Wounds and Laceration**

In present study, 7 cases of wounds and laceration were recorded. The haematological examination revealed low values of haemoglobin (range 5.6-10.5 gdl\(^{-1}\)) and PCV (range 18-33\%) than normal reference range in 4 cases. The TLC values were (17.4 and 20.6 \(\times 10^3\) \(\mu\text{L}^{-1}\)) found increased in 2 cases. The differential counts showed neutrophilia (76 and 78\%) in 2 cases. The TEC and platelet counts were recorded within normal reference range.

In biochemical study, the ALT, AST, ALP, TP, serum urea and creatinine in all the cases of wounds and laceration were found within normal range. The transferrin saturation (TS) value (range 39-40\%) was found within normal reference range.

**Anal sac disease**

Out of 4 cases of anal sac disease, the Hb (range 9.5-10.2 gdl\(^{-1}\)) and PCV (range 29-32\%) values were decreased in 3 cases in dogs of the present study. The TEC and platelet counts were normal in all the cases. The TLC values were (13.1 and17.2 \(\times 10^3\) \(\mu\text{L}^{-1}\)) recorded towards higher limit of normal reference range in 2 cases. Differential counts revealed neutrophilia (range 73-79\%) in 3 cases and towards higher limit of normal reference range in 1 case.

The biochemical examination revealed increased values of ALT (58.0 and 58.3 \(\text{uL}^{-1}\)) in 2 cases, ALP (102.8 and 103.2 \(\text{uL}^{-1}\)) in 2 cases and TP (range 76.0-81.2 gL\(^{-1}\)) in 3 cases. The AST, serum urea and creatinine
values in all the cases of anal sac disease did not altered and were found within normal reference range.

**Acute moist dermatitis**

In present study, 4 cases of acute moist dermatitis were recorded. The haematological examination revealed decreased Hb (range 8.8-10.0 gdl⁻¹) and PCV (range 27-31%) values. The TEC, TLC, differential counts and platelets were found within normal reference range.

In biochemical examination, the increased values of ALT (62.9 and 63.6 uL⁻¹) in 2 cases, ALP (range 100.0-107.2 uL⁻¹) in 3 cases and in 1 case (98.5 uL⁻¹), towards higher limit of normal reference range. The TP values (75.8 and 76.2 gL⁻¹) in 2 cases were found increased than the normal reference range while in 1 case towards higher limit (75.0 gL⁻¹) of normal range. The AST, serum urea and creatinine levels in all the 4 cases of acute moist dermatitis were found within normal range.

**Aural haematoma**

In present study, no alterations in haematological parameters were recorded in 3 cases of aural haematoma except the decreased Hb (range 10.2-11.0 gdl⁻¹) and PCV (range 32-33.1%) values than normal reference range. In biochemical study, the ALT, AST, ALP, TP, serum urea and creatinine in all the cases of aural haematoma were found within normal range.

**Cutaneous foreign bodies**

Out of 2 cases of cutaneous foreign bodies in dogs of the present study, the Hb value (9.5 gdl⁻¹) and PCV (29%) was recorded low in 1
case. The TEC, TLC and platelet counts were found normal, whereas, neutrophilia (76 and 78%) was recorded in both the cases.

In biochemical study, the ALT, AST, ALP, TP, serum urea and creatinine in the cases of cutaneous foreign body were found within normal range.

**Juvenile cellulitis**

The haematological examination in 2 case of juvenile cellulitis revealed decreased Hb (10.0 and 11.2 g\text{dL}^{-1}) and PCV (32 and 33%). The increased TLC value (18.0 and 19.2 x 10^3 \mu\text{L}^{-1}) with marked neutrophilia (83 and 84%) were recorded in both cases. The TEC and platelet counts did not altered and found within normal clinical range.

In biochemical examination, the ALT (54.5 and 46.0 \text{uL}^{-1}), AST (13.0 and 17.0 \text{uL}^{-1}) values were found within normal range. The ALP value was found towards higher limit (98.1 \text{uL}^{-1}) in 1 case and have normal value (79.4 \text{uL}^{-1}) in other case. The TP value (77.0 \text{uL}^{-1}) found increased in 1 case and towards higher limit (74.2 \text{uL}^{-1}) in 1 case of normal reference range. The serum urea and creatinine levels in 2 cases of juvenile cellulitis were found within normal range.

**Cutaneous abscess**

In a case of cutaneous abscess, the TEC, TLC, DLC and Platelets counts were recorded within normal range. The Hb (8.6 g\text{dL}^{-1}) and PCV (28%) values were found decreased than normal reference range.

In biochemical study, the ALT (48.0 \text{uL}^{-1}), AST (15.0 \text{uL}^{-1}), ALP (88.6 \text{uL}^{-1}), TP (62.2 \text{gL}^{-1}), serum urea (5.5 \text{mmolL}^{-1}) and creatinine (89.0 \mu\text{molL}^{-1}) value were also found within normal reference range.
**Surgico-therapeutic management**

**Acute otitis externa** (Figs. 1-13)

In present study, 13 cases of acute otitis externa underwent surgico-therapeutic management. In 10 cases, cleansing of ear canal was done with propylene glycol, lactic acid, spherulites, docusate sodium, and salicylic acid solution on alternate days.

In 6 cases, topical ofloxacin, clotrimazole, betamethasone dipropionate, lignocaine HCl ear drops were instilled twice a day along with simultaneous parenteral administration of ceftriaxone (15-25 mg/kg, IM) and prednisolone acetate (0.5 mg/kg, IM) for 5 days. In 4 cases, topical administration of chloramphenicol, beclomethasone dipropionate, clotrimazole, lignocaine HCl ear drops along with oral administration of marbofloxacin (2 mg/kg, PO) and dexamethasone sodium (0.5-2 mg, IM) parenterally for 7 and 5 days, respectively. In 1 case, Itraconazole (5-10 mg/kg, PO) also administered orally for 3 days. The recovery was seen in 9/10 animals after follow up treatment period of 7 days.

In 1 case, surgical management of otitis externa was done by resection of lateral ear canal using Zepp's method to facilitate the drainage from strictured vertical ear canal. The post-operative follow up treatment comprised of parenteral administration of ceftriaxone (15-25 mg/kg, IM) for 7 days, meloxicam (0.2 mg/kg, IM) and multivitamin (1-2 ml, IM) for 3 days along with ketoconazole (10 mg/kg, PO) orally for 3 days and topical instillation of ofloxacin, clotrimazole, betamethasone dipropionate, lignocaine HCl ear drops. Sutures were removed on 10th day. Post-operative complication of few suture dehiscence occurred, so further healing completed with 2nd intention and complete recovery occurred on 15th post-operative day (Fig. 13).
In 3 cases of acute otitis externa, cleansing of ear canal was done with clinical hydrogen peroxide solution on alternate days. Topical ciprofloxacin ear drops were instilled twice a day along with parenteral administration of amoxicillin + sulbactum (10-20 mg/kg, IM) and prednisolone acetate (0.5 mg/kg, IM) for 7 days. In 1 case, topical gentamicin-dexamethasone (Gentacort-D) ear drops were instilled along with enrofloxacin (5-20 mg/kg, PO) orally and prednisolone acetate (0.5 mg/kg, IM) parenterally for 7 days and Ketoconazole (10 mg/kg, PO) orally for 3 days. The recovery occurred in 3 cases after 7th–10th day of follow up treatment.

**Wound and lacerations** (Figs 14-20)

In present study, 7 cases of wound and lacerations underwent surgico-therapeutic management. The 6 cases of wounds (3 avulsion wound, 2 maggot wound and 1 dog bite) were treated with antiseptic dressing with povidone iodine and normal saline solution after debridement and coumphos (3%), propoxur (2%), sulfanilamide (5%) powder for 10 days, along with parenteral amoxicillin + sulbactum (10-20 mg/kg, IM) for 5 days, meloxicam (0.2 mg/kg, IM) for 3 days and multivitamin (1-2 ml, IM) parenterally administered for 5 days. One case was dressed with spray containing holy basil (tulasi), zinc (yashad bhasma), neem (nimba), and turmeric. In 1 case of laceration at upper lip, sutures were applied under sedation. The complete recovery was observed after 14th day of follow up treatment in all the cases.

**Acute moist dermatitis** (Figs 21-24)

In present study, the surgico-therapeutic management in 4 cases of acute moist dermatitis in dogs was employed by shaving and cleaning of the affected area with chlorhexidine gluconate (0.3%), cetrimide (3%).
In 2 cases, topical application of ointment containing clobetasol propionate 0.025%, ofloxacin 0.1%, miconazole nitrate 2.0%, zinc sulphate 3.0% applied on affected part twice a day, for 12 days along with cephalexin (22-30 mg/kg, PO) for 7 days, dexamethasone sodium phosphate (0.5-2 mg, IM) for 5 days in decreasing dose and methylcobalamin, pyridoxine HCl and nicotinamide (1-2 ml, IM) for 3 days, administered parenterally. Animals recovered after 10th day of follow up treatment.

In another 2 cases, mupirocin ointment was applied on affected part twice a day for 10 days along with cefpodoxime proxetil (5-10 mg/kg, PO), prednisolone acetate (0.5 mg/kg BW IM) for 7 days in decreasing dose and methylcobalamin, pyridoxine HCl and nicotinamide (1-2 ml IM) for 5 days, administered parenterally. Animals recovered after 7th day of follow up treatment.

**Anal sac disease** (Figs 25-28)

The surgico-therapeutic management of anal sac disease in 4 dogs of the present study was employed. In 2 cases, manual expression of purulent discharge from anal sacs was done and the inflamed anal region was flushed with chlorhexidine gluconate (0.3%), cetrimide (3%) solution along with parenteral administration of amoxicillin + sulbactum (10-20 mg/kg, IM) for 5 days, meloxicam (0.2 mg/kg, IM) and methylcobalamin, pyridoxine HCl and nicotinamide (1-2 ml, IM) for 3 days. Lukewarm fomentation to anal region with soft fibrous diet was also advised to the owners.

In present study, 1 case was diagnosed as adenocarcinoma of anal gland and other as anal gland impaction. These were treated by surgical excision of the tumorous part in the former and the impacted gland of one side in the latter case under general anaesthesia using atropine sulphate,
xylazine and ketamine combination. Post-operative dressing of suture line was performed using clinical spirit regularly along with parenteral administration of amoxicillin + sulbactum (10-20 mg/kg, IM) for 5 days, meloxicam (0.2 mg/kg, IM) and methylcobalamin, pyridoxine HCl and nicotinamide (1-2 ml, IM) for 3 days and soft and laxative diet with lactulose (5 ml, b.i.d., PO) for 7 days. Elizabethan collar was also applied to protect the anal region from self-inflicting injuries and biting. Sutures were removed on 12th day. All the animals with anal sac disease showed good recovery on 12th day of follow up treatment and recurrence was found in 1 case.

**Aural haematoma** (Figs 29-31)

In present study, surgico-therapeutic management of aural haematoma in 3 cases was employed to restore the cosmetic effects of the pinna in dogs of the present study. In 1 case, aspiration of haematoma was performed by applying vacutainer to the ear pinna under sedation. The vacutainer was changed every 8-10 hour interval. Supportive treatment was provided with parenteral administration of ceftriaxone (15-25 mg/kg, IM) for 7 days, meloxicam (0.2 mg/kg, IM) and methylcobalamin, pyridoxine HCl and nicotinamide (1-2 ml, IM) for 3 days. The vacutainer set was removed till no further fluid was collected and the sterile dressing bandage was applied to the ear for 5 days. The dog successfully recovered after 10th day of follow up treatment.

In 2 cases, surgical therapy was performed under general anaesthesia with atropine sulphate, xylazine and ketamine combination. A linear incision was made on the inner surface of the pinna, over the haematoma. The fibrin clot was removed and the cavity was flushed with sterile saline. The cavity was closed by placing mattress suture through
the ear using non-absorbable sutures and small pieces of Intravenous catheter tube. The sutures were placed long axis of the pinna, avoiding large blood vessels. The linear incision was left open to allow drainage and the mattress sutures were staggered to obliterate dead space. Post-operative dressing of suture line was performed alternately, for 10 days along with parenteral administration of ceftriaxone (15-25 mg/kg, IV) for 7 days, dexamethasone sodium phosphate (0.5-2 mg, IM) and methylcobalamin, pyridoxine HCl and nicotinamide (1-2 ml, IM) for 3 days. Elizabethan collar application was advised to further prevent self-trauma or damage to the bandage. Sutures were removed on 14th day. The animals recovered successfully after the follow up treatment.

**Cutaneous foreign bodies** (Figs 32-33)

In present study, the surgico-therapeutic management in 2 cases of cutaneous foreign bodies was employed by removing the thorn from the affected part and antiseptic dressing was done with povidone iodine on alternate days along with clindamycin (11 mg/kg, PO) and prednisolone acetate (0.5 mg/kg, IM) administered for 5 days along with prophylactic administration of tetanus toxoid (1ml, IM). The animals showed good recovery after 7 days of follow up treatment.

**Juvenile cellulitis** (Figs 34-35)

The surgico-therapeutic management of juvenile cellulitis in 2 dogs of the present study was employed. The treatment involved primary antiseptic dressing of lesions with povidone iodine and topical application of mupirocin (2%) ointment applied for 7 days, along with parenteral administration of amoxicillin + sulbactum (10-20 mg/kg, IM) for 5 days, cyclosporine (5-10 mg/kg, PO) and ketoconazole (10 mg/kg, PO) for 7
days and 3 days, respectively. Recovery was evident in both the cases as the clinical signs subsided after 7\textsuperscript{th} day of follow up treatment.

**Cutaneous abscess** (Fig. 36)

The surgico-therapeutic management of cutaneous abscess in a pup was confirmed by exploratory puncture with a sterile needle. The abscess was surgically drained by making a crisscross incision and the pyogenic membrane was destroyed by flushing with povidone iodine and normal saline. The abscess was later dressed with spray containing holy basil (tulsi), zinc (yashad bhasma), neem (nimba), turmeric (haridra), for 7 days along with parenteral administration of amoxicillin + sulbactum (10-20 mg/kg, IM) for 5 days, meloxicam (0.2 mg/kg, IM) and methylcobalmine, pyridoxine HCl and nicotinamide (1-2 ml, IM) for 3 days. Animal well responded to the treatment and recovered after 10\textsuperscript{th} of follow up treatment.

In present study, the dermatological emergencies were although, not life-threatening and the individual cases carried a favourable prognosis. The percent recovery of these dermatologic emergencies is shown in table 7 during the follow up treatment with very less incidence of recurrence and complications encountered during surgico-therapeutic treatment of these emergencies.
DISCUSSION

Skin disease is one of the most common reasons dogs are taken to the veterinarian (Kersey et al, 2013). A dermatology case might not immediately be thought of as an emergency. There are some dermatological conditions that need to be seen by a veterinary surgeon as a matter of urgency (Rhodes, 2011).

Although dermatology may be regarded as a medical specialty with few emergencies, they do exist and range from primary cutaneous disorders to severe systemic conditions with skin manifestations (Chacon, 2015). Many dermatologic conditions can cause mild, localized signs, some, can cause severe cutaneous signs and may have serious systemic consequences. These patients may present on an emergency basis and require intensive monitoring, diagnostics, and care.

The overall incidence rate of canine dermatological disorders in the present study was 17.14% (36/210 cases). The results are in close agreement with the observation of Gera et al (2009) who also observed an overall incidence rate of canine dermatological disorder as 17.67 % (463/2620 cases). Khoshnegah et al (2013) also noted dermatological disorders in 17.00% (221/1299) of all the dogs examined in a survey study of domestic dogs in Iran. However, Upadhyay et al (2005) and Ayodhya et al (2006) reported 12.75% and 3.83% dogs suffering from with various dermatological disorders, respectively.

Sex wise incidence of dermatological emergencies was 61.11% in male and 38.89%, in female dogs of the present study. These results showed close resemblance with the incidence of pyoderma in (64.58%) male dogs and (35.42%) female bitches (Kumar and Joshi, 1996). The high incidence rate in male was also observed by Kumar et al (2006), Brilhante et al (2003). High incidence of dermatological disorder 63.7% in
male dog, compared to 36.3% in female dog has also been reported (Varghese et al., 1994) might be due to the fact that more male dogs are kept by most of the owners. However, Nayak et al (1999) and Jayagopal et al (1992) showed no significance difference between both the sexes.

The incidence rate of canine dermatological emergencies of different breed of dog was observed higher (36.11%) in German shepherd; (22.22%) in Labrador; (16.67%) in non-descript (19.44%) and lowest incidence rate in Doberman, Saint Bernard, Dalmatian, Rottweiler, Bully, Spitz, Cocker Spaniel, Neapolitan Mastiff (each 2.78%). Nayak et al (1999) also observed the incidence rate of different breed as Tibetan Apso (41%); Doberman (26%); Alsatian (16%) and mongrels (17%). Senthil et al (2011) and Ajula et al (1999) also reported the incidence of dermatitis was higher in pure bred dog (69%) than non-descript dog (31%). Khoshnegah et al (2013) also noted Spitz (odds ratio = 3.38; p = 0.001), Terriers (odds ratio = 2.52; p < 0.001) and German Shepherds (odds ratio = 1.90; p = 0.001) appeared to be at increased risk for dermatological disease. In addition, Khorasani large cross breed dogs (odds ratio = 0.36; p = 0.003) and mixed breed dogs (odds ratio = 0.33; p < 0.001) showed decreased risk for dermatological conditions. However, Mathews (1999) observed that non-descript ones were mostly affected among the dogs which were investigated, probably due to lesser care and attention given to them.

Highest incidence of dermatological emergencies were found among dogs between 1-3 years of age (30.56%) followed by those 3-6 year age group (27.78%), (25%) <1 year age group and (22.22%) in the age group of more than 6 years. Nayak et al (1999) also reported a higher incidence (60%) in dogs up to 1 year of age, than 23% in 1-2 years and above 2 years of age (17%). However, Khoshnegah et al (2013) found no apparent age or sex predilections for dermatological disease as a whole in a survey of dermatological disorders in dogs in Mashhad, Iran.
Acute otitis externa has the higher incidence (36.11%), wound and lacerations (16.67%), acute moist dermatitis and anal sac (11.11%), each, aural haematoma (8.33%), cutaneous foreign bodies and juvenile cellulitis (5.56%) each and lowest (2.78%) incidence in cutaneous abscess was diagnosed in dogs of the present study based on the signalment and predominant clinical signs. Hill et al (2006) observed pruritus as the most common presenting sign, accounting for 30 to 40 per cent of the dermatological consultations with the most common final diagnoses were otitis, pyoderma, anal sac impaction, flea infestation and atopic dermatitis in dogs. Scott and Paradis (1990) also observed that the most common groups of dermatological disorders encountered were bacterial folliculitis and furunculosis, allergic dermatitis, endocrinopathy, neoplasia, ectoparasitism, and immune-mediated dermatitis in dogs. The diagnosis was made on the basis of presented clinical signs, physical examination and various diagnostic tests performed on these cases (Hill et al, 2006).

In present study, acute otitis externa was observed in 13 dogs. The condition is of frequent occurrence in dogs with consistent clinical signs of pruritus of ear or face, associated with congestion and swelling of the auditory canal and purulent auricular discharge or excessive wax (Reme et al, 2006; Besingnor and Grandemange, 2006). Usui et al (2011) used video otoscope for examination of ear canal and tympanum.

Wound and lacerations were diagnosed in 7 dogs of the present study usually with obvious signs of external trauma (Plunkett, 2007). Bite wounds are seen most common in intact males due to roaming and aggression. Common locations are at face and neck, tail base, shoulder and distal limbs. Extensive loss of the skin occurred in bite wounds and degloving injuries may predispose to sepsis. Bite wounds caused crushing, avulsion, and devitalization of tissues beneath the skin (Griffin,
Beardsley and Schrader (1995) recorded wounds of limbs resulted from trauma during automobile accident.

In present study, acute moist dermatitis was observed in 4 dogs and had been a common dermatological condition seen in dogs and cats Sue (2014). Acute moist dermatitis also known as pyotraumatic dermatitis, "hot spot" affecting mainly young dogs with a higher prevalence in breeds such as St Bernard, Golden retriever, German shepherd and Rottweiler (Birgit et al, 2004; Holm et al, 2004). A dense coat seems to be a predisposing factor. Narasimha and Shwetha (2013) recorded erythematous, swollen, exudative area and alopecia clinically.

Anal sac disease was observed in 4 animals in present study. Small breeds are more predisposed than large breeds (Rubin, 2013) with predominant clinical signs of scooting across the ground, tenesmus, straining to defecate, foul discharge or pus, sacculitis, pain, biting or chasing the tail, malodorous discharge, swelling around the anal area and behavioural change and pain upon palpation in perianal area or upon rectal palpation (Birchard and Sherding, 1994; Plunkett, 2007). Anal sac disease begins as an uncomfortable impaction and progressed to an infection or abscess (Foster and Smith, 1997; Flower, 2014).

In present study, aural haematoma was recorded in 3 dogs. Aural haematoma could be unilateral or bilateral, in both sexes and different age (Mohsin, 2010). Pruritic conditions, ear mites, atopy may lead to the formation of aural haematoma (Plunkett, 2007) secondary to self-trauma to pinna, violent head shaking, acute or chronic otitis externa (Blattler et al, 2007; Brown, 2010). It is clinically represented by presence of collection within cartilage plate of ear, initially fluid, soft, fluctuating, and later became more firm and reduced in size and volume due to resorption and fibrosis (Florin et al, 2011).
Cutaneous foreign bodies were recorded in 2 animals in present study included plant material. Other foreign bodies may include metal objects, wood materials and miscellaneous items such as collars, rubber bands, bee stings (Plunkett, 2007). Foreign bodies of plant origin were the most commonly implanted foreign bodies (Brennan and Ihrke, 1983). These foreign bodies are either intentionally driven but often embedded accidently. Predominant clinical signs of granulomatous inflammation resulted from host response directed against the foreign body and contaminant infectious agent carried into wound, moist, erythematous, swollen area upon close inspection of interdigital spaces and plantar surface of the paw along with lameness during walking, licking and pain on palpation of affected part (Gross et al, 2008).

In present study, juvenile cellulitis was recorded in 2 dogs. Canine juvenile cellulitis is an uncommon pustular and granulomatous disease. Vesicles, pustules, serous to purulent exudates, crusts, cellulitis and alopecia develop on lips, muzzle and eyelid margins (Medleau and Hnilica, 2006) with submandibular adenopathy (Reimann et al, 1989; Neuber et al, 2004). Secondary bacterial infections are possible. Pyrexia and depression, along with joint pain, are inconsistent clinical signs (White et al, 1989; Hutchings, 2003).

In present study, cutaneous abscess was recorded in 1 dog, diagnosed as localised painful swelling and blood mixed pus on exploratory puncture. Lesions are mostly found on the tail base, shoulder, neck, face or leg (Medleau and Hnilica, 2006). Yoshihiko (2009) also aspirated pus like fluid from the swelling.

Haematological examination is performed in dermatological cases when skin lesions associated with systemic illness are suspected; prior to and during immunosuppressive or cytotoxic therapy (Hill, 2005). The values are very important in assessing healthy and diseased companion
animals. A PCV and microscopic examination of a blood film still from the cornerstones of clinical veterinary haematology, but quantitative counts of different blood cells were also needed to better assess an animal’s health status (Becker et al, 2008). In present study, alterations in haematological values of Hb, PCV, TEC, TLC and DLC were recorded in dogs with various dermatological emergencies.

The Hb and PCV were found to be decreased in 5 cases of acute otitis externa, 2 cases of wound and lacerations, 4 cases of acute moist dermatitis, 3 cases of aural haematoma, 1 case of cutaneous foreign body, 2 cases of juvenile cellulitis and 1 case of cutaneous abscess. In present study, decreased Hb and PCV (anaemia) due to parasitic infestation, bleeding, malnutrition and chronic inflammation (Stein, 2004; Hill, 2005; Kintzer, 2014).

Leukocytosis was found in 2 cases of wound and lacerations, 1 case of anal sac disease and 2 cases of juvenile cellulitis in present study. The leukocytosis could have resulted due to chronic infection, stress response, steroid therapy (Hill, 2005), from toxin released due to tissue damage or necrosis produced by inflammation or from secondary bacterial infection (Gupta and Prasad, 2001). White et al (1989) observed leukocytosis in juvenile cellulitis. In present study, high leucocyte values indicated presence of inflammation and secondary bacterial infection in cases of wound and lacerations and anal sac disease, while acute inflammation in juvenile cellulitis.

Neutrophilia was found in 13 cases of acute otitis externa, 2 cases of wound and lacerations, 3 cases of anal sac disease, 2 cases of cutaneous foreign bodies, 2 cases of juvenile cellulitis and 1 case of cutaneous abscess. In present study, neutrophilia might be due to heavy bacterial load which might result in mobilization of marginal and bone marrow granulocytic pool as also reported by Schalm (1963). Walaa et al
(2008) observed that neutrophilia was attributed to immediate type hypersensitivity that led to frequent scratching and subsequent injuries resulting secondary pyoderma, which was supported by Wissenlink et al (1990) who also found immediate type hypersensitivity may contribute in the pathogenesis of pyoderma in German Shepherd dogs. Smith (2000) stated that localised purulent lesion such as pyoderma induced greater neutrophilia in dogs. White et al (1989) also found marked neutrophilia induced in juvenile cellulitis in dogs. In present study, neutrophilia indicated presence of infection and inflammation in acute otitis externa, wound and lacerations, cutaneous foreign bodies, anal sac disease and cutaneous abscess, while stress and inflammation in juvenile cellulitis.

In present study, alterations in biochemical values of ALT, AST, ALP and TP were justified as routine biochemistry was usually performed when endocrine disease, systemic illness are suspected, prior to and during immunosuppressive therapy. The biochemical profile in present study is designed to provide information regarding most of the common organ dysfunction (Hill, 2005). The ALT, AST and ALP were affected by liver disease, muscle damage, hyper or hypothyroidism, corticosteroid administration; SUN indicated liver disease and lesser extent liver dysfunction and creatinine especially indicated in renal dysfunction as mentioned by Whitbread (2015). TP was justified because it indicate liver dysfunction and (fibrinogen) play vital role in healing process and synthesize in liver as plasma protein as mentioned by Miller et al (1951). TS values were justified because transferrin play vital role to regulate iron level and redistribution within animal body as mentioned by McCrown and Specht (2011).

The values of ALT were found increased in 5 cases of acute otitis externa, 2 cases of anal sac disease and 2 cases of acute moist dermatitis in present study. Increase in the values of ALT in present study might be
due to aggravated immunosuppression with glucocorticoid or affecting liver functions in atopic dermatitis as mentioned by Dulman et al (2015). Abraham et al (2005) observed that ototopical dexamethasone treatment which induced a marked suppression in resting plasma cortisol concentration also suppress HPA function (otitis externa or media treatment). In present study, high ALT values indicated treatment with steroids, ketoconazole and other cytotoxic drug therapy in cases of acute otitis externa, acute moist dermatitis and anal sac disease are in accordance to Hill (2005).

In present study, the ALP values were increased in 4 cases of acute otitis externa, 2 cases of anal sac disease and 2 cases of acute moist dermatitis. Increase in ALP was observed might be due to inflammatory response or excessive circulating amounts of glucocorticoids. Ferguson et al (2012) observed increase in the value of ALP due to inflammation caused by phthalates. Dulman et al (2015) found high value of ALP due to aggravated immunosuppression with glucocorticoid or liver dysfunction. Elevated ALP values were observed in young animals less than 8 months old due to the presence of bone isoenzyme of alkaline phosphatase (Hill, 2005).

Increase in the values of total protein were observed in the present study might be due to dehydration or overproduction of specific protein in infection and neoplasms as mentioned by Bertholf (2014). Total protein values were found high in 6 cases of otitis externa, 3 cases of anal sac diseases, 2 cases of acute moist dermatitis and 1 case of juvenile cellulitis. Mosier et al (1978); Bereiter-Hahn et al (1986); Rainbird (1987); Aujla (1993) and Sharma et al (2015) reported decrease in the value of total protein in allergic dermatitis. However, Hagiwara and Germano (1974) and Sharma and Gupta (2005) observed no change in protein
value in dermatitis. Hyperalbuminaemia may also be associated with parasitism, chronic inflammation or neoplasia (Hill, 2005).

In present study, several surgico-therapeutic strategies were used to treat various dermatological emergencies.

Treatment of acute otitis externa was aimed at resolution of specific primary causes, cleaning, relieving inflammation and elimination of any microbial infection (Bensignor and Forsythe, 2012). In present study, out of 13 cases, ear cleaning was done with cleansing of ear canal was done with propylene glycol, lactic acid, spherulites, docusate sodium, salicylic acid solution (Epiotic) in 10 cases whereas, with hydrogen peroxide in 3 cases. Ear cleaning is an essential component in otitis externa (Harvey et al, 2001). Topical therapy with ofloxacin, clotrimazole, betamethasone dipropionate, lignocaine HCl was done in 6 cases and chloramphenicol, beclomethasone dipropionate, clotrimazole, lignocaine HCl suspension in 4 case, ciprofloxacin in 2 case and gentamicin, dexamethasone in 1 case. Studdert and Hughes (1991) used solution containing miconazole, polymyxin and prednisolone. Ceftriaxone and prednisolone; marbofloxacin and dexamethasone sodium; enrofloxacin and prednisolone; amoxicillin + sulbactum and prednisolone acetate were administered systemically. Ketoconazole was also given orally. Rougier et al (2005) used marbofloxacin-clotrimazole-dexamethasone and polymyxin-B, miconazole and prednisolone otic suspensions. Kiss et at (1997) used ketoconazole, gentamycin sulphate and mazipredone hydrochloride. Nuttall (1998) used saline flushing of ear canal along with fluoroquinolones, glucocorticoids (prednisolone) and polyvalent ticarcillin ear drops.

In present study, Zepp’s operation for surgical resection of lateral wall of vertical ear canal was done in 1 case of chronic otitis externa. Sylvestre (1998) also used Zepp’s method in otitis externa, recorded 86.5% procedure failure in Cocker Spaniels and other breeds it was
recorded as 63% acceptable and 37% unacceptable. With improved medical management, surgery should be considered as a salvage procedure for otitis that involved irreversible pathological changes (Bradly, 1988). Smek (2011) recommended total ear canal ablation combined with bulla osteotomy as a salvage procedure primarily for end stage-inflammator ear canal disease, neoplasia and severe traumatic injury. Dehiscence of 2-3 sutures was observed on 3rd day due to owner negligence and further recovery were observed by 2nd intention healing. The animals recovered successfully within 7 days where as, it took 15 days to heal with an overall 92.31% recovery.

In present study, the surgico-therapeutic management of cases of wound and lacerations was aimed in debridement of devitalizing tissue and controlling haemorrhage. The cases were treated with proper debridement with povidone iodine mix normal saline solution and coumphos (3%), propoxur (2%), sulfanilamide (5%) powder along with systemic administration of amoxicillin + sulbactum, meloxicam and multivitamins. Two cases was dressed with holy basil (tulasi), zinc (yashad bhasma), neem (nimba), and turmeric (haridra) containing herbal spray. Rooster and Declercq (2008) used honey dressing in skin wounds. Electrical stimulation has also proved highly effective in promoting wound healing (Sumano et al, 2002). Management of large skin defect viz. severe dog bite, large burn wound sustained from heating pad and large myxosarcoma, bilateral skin fold rotation-advancement flaps (SFRAFs) was recommended (Dunn et al, 2011). In present study, vertical mattress suture were applied to repair lacerated upper lip 1 case. Beardsley and Schrader (1995) also treated wounds by lavaging, partial suturing, bandaging and applying splint devices. The animals with serious injuries must be stabilised from shock by administering oxygen and intravenous
fluids and re-evaluating the perfusion status of the animal (Plunkett, 2007). All the animals favoured excellent prognosis with 100% recovery.

A satisfactory resolution of acute moist dermatitis was performed in present study to identify and treat underlying cause and to provide symptomatic treatment. The hairs around the lesions are shaved and cleaning with chlorhexidine gluconate (0.3%), cetrimide (3%) solution was done to remove crusted exudates. Chlorhexidine is non-irritating, has an excellent broadspectrum activity against bacteria, fungi and viruses and long residual effect (Noli and Morris, 2012). Topical application of antibiotic/glucocorticoid preparation like clobetasol propionate 0.025%, ofloxacin 0.1%, miconazole nitrate 2.0%, zinc sulphate 3.0%; mupirocin on affected part. Mupirocin is an excellent antibiotic exclusively for topical use. However, mupirocin resistance can be plasmid mediated in staphylococci and therefore, it should be used prudently in practice (Werner and Russell, 1999). Systemic administration of broad spectrum antibiotic like cephalaxin and cefpodoxime proxetil along with dexamethasone sodium phosphate in decreasing dose and methylcobalamine, pyridoxine HCl and nicotinamide were also given as an adjunct to topical therapy for a period. Mukesh et al (2013) used amoxicillin-clavulanate for the treatment of acute moist dermatitis. The duration of antibiotic treatment depends on the severity of lesion. High frequency of administration and long treatment durations decrease owner compliance which reduces the likelihood of a successful treatment and increased bacterial resistance (Adams et al, 2005; Noli and Morris, 2012). All the animals favoured excellent prognosis with 100% recovery.

In the present study, treatment of anal sac includes manual expression and flushing with chlorhexidine gluconate (0.3%), cetrimide (3%) solution has been useful for hastening resolution. Systemic therapy with amoxicillin + sulbactum, meloxicam and methylcobalamine,
pyridoxine HCl and nicotinamide were also given. Lukewarm fomentation of peri-anal region and soft fibrous diet is also indicated. Similar procedure was used by Foster and Smith (1997) and Rubin (2013). Immunosuppressive drugs like cyclosporine (House et al, 2006), topical tacrolimus along with oral prednisone or cyclosporine were also recommended (Stanley and Hauptaman, 2009). Anal gland adenocarcinoma and impaction of anal sac was accomplished by surgical excision of the tumour and sacculectomy under general anesthesia. Post-operatively, dressing of suture line and systemic administration of amoxicillin + sulbactum, meloxicam was done. Suture dehiscence, infection and faecal incontinence were recorded 4 days, postoperatively due to scooting and licking of area. Hill and Smek (2002) observed similar findings in sacculectomy viz. continuous licking of surgery site, faecal incontinence, and stricture formation. Spagnini et al (2008) treated anal sac gland carcinoma by using cisplatin selectively driven within tumorous cells. Same procedure of chronic anal sacculitis have also been performed (Hill and Smek, 2002 and Macphail, 2008). The incidences of postoperative complications e.g. recurrence, dehiscence of suture, tenesmus, faecal incontinence, anal stricture and flatulence have also been reported (Rhodes and Werner, 2011). The animals showed an overall 75% recovery.

In present study, surgico-therapeutic management of aural haematoma in 3 cases was employed to restore the cosmetic effects of the pinna. In 1 case, aspiration of haematoma was performed by applying vacutainer to the ear pinna under sedation. The vacutainer was changed every 8-10 hour interval. Suction drain technique using vacutainers have been stated (Medleau and Hnilica, 2006). Supportive treatment was provided with systemic administration of ceftriaxone, meloxicam and methylcobalamine, pyridoxine HCl and nicotinamide. The vacutainer set
was removed till no further fluid was collected and the sterile dressing bandage was applied to the ear. In 2 cases, surgical therapy was performed under general anaesthesia by making a linear incision over the haematoma and the contents are removed (Plunkett, 2007). The cavity was closed by placing mattress suture through the ear using non-absorbable sutures and small pieces of I/V catheter. The linear incision was left open to allow drainage and the mattress sutures were staggered to obliterate dead space. Several techniques of aural haematoma were employed using bovine teat tube (Wilson, 1983), manual expression through stab incisions in the pinna and placement of indwelling silicon rubber drains Kagan (1983), vacuum drain (Pavletic, 2015), auricular pillow padding with non-adherent compression bandage after incision and drainage (Eyarefe et al, 2013) carbon dioxide laser (Dye et al, 2002) and fibrin sealant (Blattler et al, 2007). All the animals favoured excellent prognosis with 100% recovery.

In present study, cutaneous foreign bodies were treated by removing the thorn and grass awns followed by antiseptic dressing with povidone iodine and systemic administration of clindamycin and prednisolone acetate. Prophylactic tetanus toxoid was also administered. Similar treatment has recommended by Plunkett, (2007) and Little, (2015). Complete recovery was seen in both the animals.

In present study juvenile cellulitis were treated by antiseptic dressing of lesions using povidone iodine and topical application of mupirocin (2%) along with systemic administration of amoxicillin + sulbactum and prednisolone acetate while cyclosporine in place of prednisolone in other case. Bassett et al (2005) and Hutchings (2003) recommended only glucocorticoid therapy. Cyclosporine and prednisolone were also used by Park et al (2010) for treatment of juvenile cellulitis. The
disease has good prognosis if response is seen in 4-5 days following treatment and complete recovery was noticed in both cases.

In the present study, abscess was drained using crisscross incision and antiseptic dressing with povidone iodine mixed normal saline primarily, and topical application of holy basil (tulasi), zinc (yashad bhasma), neem (nimba), turmeric (haridra) herbal spray and systemic administration of amoxicillin + sulbactum, meloxicam and methylcobalamine, pyridoxine HCl and nicotinamide. Six et al (2008) used cefovecin and cefadroxil for secondary superficial pyoderma abscesses and infected wounds in dogs. Yoshihiko (2009) recommended the use of semiconductor laser surgical unit for surgical debridement. Fox et al (1995) used doxycycline orally along with debridement of abscess. Complete recovery was observed after 10th day of follow up treatment.
SUMMARY

The present study entitled “A study on surgico-therapeutic management of various dermatological emergencies in dogs” was conducted on 36 clinical cases of dogs of either sex, different breed and age groups. The Selection of animals was performed on the basis of collection of detailed history, predominant clinical signs and haematobiochemical observations.

The signalment of the animal was recorded and details regarding the age, breed, sex, hair coat, diet, seasonal occurrence of disease, time of onset, present condition and progression of the ailment, any previous investigation and therapy were recorded.

Thorough clinical examination was carried out in dogs on the day of presentation and also on the follow up days, wherever feasible for pattern of hair loss, presence of skin lesion either primary or secondary, location of lesion, and, total area of body affected by the dermatological affection. Various dermatological emergencies were diagnosed based on the presence of predominant clinical signs viz. acute otitis externa, lacerations and wounds, acute moist dermatitis, anal sac disease, aural haematoma, cutaneous foreign bodies, juvenile cellulitis and cutaneous abscess.

Haemato-biochemical examination was performed in dogs in order to evaluate the parameters; haemoglobin (Hb), packed cell volume (PCV), total erythrocytes count (TLC), total leucocytes count (TLC) and differential leucocyte count (DLC) and quantitative estimation of alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), total protein (TP), serum urea nitrogen (SUN) and creatinine using standard spectrophotometric methods. Transferrin saturation was measured from the ratio of serum iron concentration to total iron binding capacity (TIBC).
The alterations in haemato-biochemical values in dogs with various dermatological emergencies were corroborated with the clinical diagnosis.

Surgico-therapeutic management of various dermatological emergencies were employed using various medicinal and surgical treatment regimens or a combination of surgical treatment along with supportive medicinal treatment. The outcome of these various treatment regimens employed in dogs with various dermatological emergencies were assessed for the recovery in percentage as per the opinion of owner and the examiners observations.

In present study, the overall incidence of dermatological emergencies was 17.14% recorded in 36 cases out of total 210 cases of dogs. The sex wise incidence of dermatological emergencies was recorded as 61.11% in male (22/36) was higher than 38.89% in female (14/36) dogs.

The highest incidence of dermatological emergencies was recorded as 30.56% in dogs of 1-3 years age group and lowest incidence was recorded 16.67% in dogs more than 6 years age. The German shepherd breed has the highest incidence 33.33%, of dermatological emergencies.

Acute Otitis externa was reported in 13 dogs (5 male, 8 female), has the higher incidence (36.11%) among all the dermatological disorders. The incidence of wound and lacerations is (19.44%) was reported in 7 dogs (5 male, 2 female). Acute moist dermatitis was reported in 4 dogs (3 male, 1 female) and anal sac disease in 4 male dogs. Both these dermatological emergencies have the 11.11% incidence each. The aural haematoma was reported in 3 dogs (2 male, 1 female) with 8.33% incidence. The male have higher incidence (66.37%) than female dogs (33.63%). The incidence of cutaneous foreign bodies and juvenile cellulitis was 5.56% each. These were reported in 2 dogs each, with the same
incidence in male and female dogs. Lowest incidence of cutaneous abscess (each 2.78%) was reported in 1 male dog.

Out of 13 cases of acute otitis externa, decreased Hb (range 8.6-9.6 g dL$^{-1}$) and PCV (range 26-32%) was recorded in 5 cases and marked neutrophilia (range 83-88%) in all the cases. The TLC was recorded 15 and 16x10$^3$µL$^{-1}$ recorded in 2 cases, found towards higher limit of normal reference range. The values of ALT (range 58.2-73.4 uL$^{-1}$) in 5 cases, ALP (range 103.5-109.7 uL$^{-1}$) in 4 cases and TP (range 78.2-82.2 gL$^{-1}$) in 4 cases were found increased.

In present study, low values of haemoglobin (range 5.6-10.5 gdL$^{-1}$) and PCV (range 18-33%) was recorded in 4 cases. The TLC values were (17.4 and 20.6 x 10$^3$ µL$^{-1}$) found increased and neutrophilia (76 and 78%) in 2 cases. The ALT, AST, ALP, TP, serum urea, creatinine and transferrin saturation (TS) value (range 39-40%) was found normal.

The Hb (range 9.5-10.2 gdL$^{-1}$) and PCV (range 29-32%) values were decreased in 3 cases of anal sac disease in dogs. The TLC values were (13.1 and 17.2 x 10$^3$ µL$^{-1}$) recorded towards higher limit of normal reference range in 2 cases. Neutrophilia (range 73-79%) was observed in 3 cases. Increased values of ALT (58.0 and 58.3 uL$^{-1}$) and ALP (102.8 and 103.2 uL$^{-1}$) in 2 cases and TP (range 76.0-81.2 gL$^{-1}$) in 3 cases were recorded.

In present study, 4 cases of acute moist dermatitis revealed decreased Hb (range 8.8-10.0 gdL$^{-1}$) and PCV (range 27-31%) values. The increased values of ALT (62.9 and 63.6 uL$^{-1}$) in 2 cases, ALP (range 100.0-107.2 uL$^{-1}$) in 3 cases and in 1 case (98.5 uL$^{-1}$), towards higher limit of normal reference range. The TP values (75.8 and 76.2 gL$^{-1}$) in 2 cases were found increased than the normal reference range.
No alterations in haematological and biochemical parameters were recorded in 3 cases of aural haematoma except the decreased Hb (range 10.2-11.0 gdL^{-1}) and PCV (range 32-33.1%) values than normal reference range.

In cutaneous foreign bodies, the Hb value (9.5 gdL^{-1}) and PCV (29%) was recorded low in 1 case, whereas, neutrophilia (76 and 78%) was recorded in both the cases. The biochemical parameters were found normal.

The haematological examination in 2 case of juvenile cellulitis revealed decreased Hb (10.0 and 11.2 gdL^{-1}) and PCV (32 and 33%). The increased TLC value (18.0 and 19.2 x 10^3 µL^{-1}) with marked neutrophilia (83 and 84%) in both cases. The ALP value was found towards higher limit (98.1 uL^{-1}) in 1 case and have normal value (79.4 uL^{-1}) in other case. The TP value (77.0 uL^{-1}) found increased in 1 case and towards higher limit (74.2 uL^{-1}) in 1 case.

In a case of cutaneous abscess, the Hb (8.6 gdL^{-1}) and PCV (28%) values were found decreased while biochemical parameters were found within normal reference range.

In present study, several surgico-therapeutic strategies were used to treat various dermatological emergencies.

Treatment of acute otitis externa was aimed at resolution of specific primary causes, cleaning, relieving inflammation and elimination of any microbial infection. In present study, out of 13 cases, ear cleaning was done with cleansing of ear canal was done with propylene glycol, lactic acid, spherulites, docusate sodium, salicylic acid solution (Epiotic) in 10 cases whereas, with hydrogen peroxide in 3 cases. Topical therapy with ofloxacin, clotrimazole, betamethasone dipropionate, lignocaine HCl was done in 6 cases and chloramphenicol, beclomethasone dipropionate,
clotrimazole, lignocaine HCl suspension in 4 case, ciprofloxacin in 2 case and gentamicin, dexamethasone in 1 case. Ceftriaxone and prednisolone; marbofloxacin and dexamethasone sodium; enrofloxacin and prednisolone; amoxicillin + sulbactum and prednisolone acetate were administered systemically. Ketoconazole was also given orally.

In present study, Zepp’s operation for surgical resection of lateral wall of vertical ear canal was done in 1 case of chronic otitis externa. Dehiscence of 2-3 sutures was observed on 3rd day due to owner negligence and further recovery were observed by 2nd intention healing. The animals recovered successfully within 7 days other than last case it took 15 days to heal with an overall 92.31% recovery.

In present study, the surgico-therapeutic management of cases of wound and lacerations was aimed in debridement of devitalizing tissue and controlling hemorrhage. The cases were treated with proper debridement with povidone iodine mix normal saline solution and coumphos (3%), propoxur (2%), sulfanilamide (5%) powder along with systemic administration of amoxicillin + sulbactum, meloxicam and multivitamins. Two cases was dressed with holy basil (tulasi), zinc (yashad bhasma), neem (nimba), and turmeric (haridra) containing herbal spray. Vertical mattress suture were applied to repair lacerated upper lip in 1 case. All the animals favoured excellent prognosis with 100% recovery.

A satisfactory resolution of acute moist dermatitis was performed in present study to identify and treat underlying cause and to provide symptomatic treatment. The hairs around the lesions are shaved and cleaning with chlorhexidine gluconate (0.3%), cetrime (3%) solution was done to remove crusted exudates. Topical application of antibiotic/glucocorticoid preparation like clobetasol propionate 0.025%, ofloxacin 0.1%, miconazole nitrate 2.0%, zinc sulphate 3.0%; mupirocin applied on affected part. Systemic administration of broad spectrum
antibiotic like cephalixin and cefpodoxime proxetil along with dexamethasone sodium phosphate in decreasing dose and methylcobalamine, pyridoxine HCl and nicotinamide were also given as an adjunct to topical therapy. All the animals favoured excellent prognosis with 100% recovery.

In the present study, manual expression of anal sac and anal sac flushing with chlorhexidine gluconate (0.3%), cetrimide (3%) solution has been useful for hastening resolution. Systemic therapy with amoxicillin + sulbactum, meloxicam and methylcobalamine, pyridoxine HCl and nicotinamide were also given. Lukewarm fomentation of peri-anal region and soft fibrous diet is also indicated. Post-operatively, dressing of suture line and systemic administration of amoxicillin + sulbactum, meloxicam was done. Suture dehiscence, infection and faecal incontinence were recorded 4 days, postoperatively due to scooting and licking of area. The animals showed an overall 75% recovery.

In present study, surgico-therapeutic management of aural haematoma in 3 cases was employed to restore the cosmetic effects of the pinna. In 1 case, aspiration of haematoma was performed by applying vacutainer to the ear pinna under sedation. The vacutainer was changed every 8-10 hour interval. Supportive treatment was provided with systemic administration of ceftriaxone, meloxicam and methylcobalamine, pyridoxine HCl and nicotinamide. The vacutainer set was removed till no further fluid was collected and the sterile dressing bandage was applied to the ear. In 2 cases, surgical therapy was performed under general anaesthesia by making a linear incision over the haematoma and the contents are removed. The cavity was closed by placing mattress suture through the ear using non-absorbable sutures and small pieces of I/V catheter The linear incision was left open to allow drainage and the
mattress sutures were staggered to obliterate dead space. All the animals favoured excellent prognosis with 100% recovery.

In present study, cutaneous foreign bodies were treated by removing the thorn and grass awns followed by antiseptic dressing with povidone iodine and systemic administration of clindamycin and prednisolone acetate. Prophylactic tetanus toxoid was also administered. Complete recovery was seen in both the animals.

In present study, juvenile cellulitis were treated by antiseptic dressing of lesions using povidone iodine and topical application of mupirocin (2%) along with systemic administration of amoxicillin + sulbactum and prednisolone acetate while cyclosporine in place of prednisolone in other case. The disease had good prognosis and complete recovery was noticed in both cases.

In the present study, abscess was drained using crisscross incision and antiseptic dressing with povidone iodine mixed normal saline primarily, and topical application of holy basil (tulasi), zinc (yashad bhasma), neem (nimba), turmeric (haridra) herbal spray and systemic administration of amoxicillin + sulbactum, meloxicam and methylcobalamine, pyridoxine HCl and nicotinamide. Complete recovery was observed after 10th day of follow up treatment.

In present study, the dermatological emergencies were although, not life-threatening and the individual cases carried a favourable prognosis. The recovery was found good with very less incidence of recurrence and complications encountered during surgico-therapeutic treatment of these emergencies.
Conclusions

1. In present study, incidence of dermatological emergencies were found more in males than females, with the highest incidence in German shepherd breed and in dogs of 1-3 years age.

2. Highest incidence of acute otitis externa and lowest in cutaneous abscess was found in dogs.

3. The haemato-biochemical changes corroborated with the clinical diagnosis revealed that the alterations in various parameters were logical and in accordance to the pathology involved in dogs with dermatological emergencies.

4. The surgico-therapeutic management of various dermatological emergencies in dogs have been found effective with highest recovery in wounds and lacerations, acute moist dermatitis, aural haematoma, cutaneous foreign bodies, juvenile cellulitis and cutaneous abscess, followed by acute otitis externa and lowest in anal sac disease.
LITERATURE CITED


