Determination of prevalence external parasite on different species

Abstract

A cross sectional study was conducted from September 2016 to February 2017 at kutaber words different veterinary clinics to determine the prevalence of major skin diseases caused by ectoparasites (ticks, lice, fleas and mange), bacterial (dermatophillosis) and viral skin diseases (Lumpy skin diseases, Pox, and Contagious echyma). A total of 1662 ruminants (909 cattle, 447 sheep, and 306 goats) were examined through clinical examination and laboratory confirmation (if possible) were the method employed. The overall prevalence of skin diseases registered was 39.38%, 45.09% and 43.40% for cattle, goats and sheep respectively. The prevalence of skin diseases in cattle was ticks (25.41%), lice (5.28%), and mange (5.28%), dermatophillosis (0.88%) lumpy skin diseases (0.56%). Male animals and cross breeds were more susceptible. There was statistical significant difference between risk factors (age, sex and breed) in cattle (p<0.05). In sheep the prevalence of skin diseases was ticks (29.08%), lice (6.9%) flea (4.3%), mange (2.01%) and pox (1.12%). The prevalence of skin diseases in goats ticks (19.29%), lice (3.92%), flea (2.94%), mange (3.26%), pox (8.49%), Orf (6.86%) and there was only statistical significance difference in age category (p<0.05). The main identified tick genus were Amblyomma, Hayaloma, Boophilus and Rhipicephalus species and demalina and linogathus species lice were identified. This study demonstrates skin diseases among the most important health constraints of ruminants in Kutabre words leading to important economic losses and they urgently require control and prevention methods.

Keywords: cattle, goats, diseases, prevalence, skin, sheep, veterinary clinic

Introduction

Ethiopia has the largest livestock inventories in Africa including about 40.7millions cattle, 25.5millions sheep and 23.4million goats (CSA. 2004). Its resource of cattle, sheep, and goats ranks 1st, 3rd and 2nd respectively in Africa.1 The development of leather industry requires great quality of raw materials of various origins, the principal source of which is livestock industry. Although the livestock production and tanning industry of the world are increasing in number, the source of the material for the tanning industry is limited both in quantity and quality.2 Ethiopia produce about 2.7millions of hides, 8.1millions of sheep skin and 7.5millions of goat skin per annum and is the leading export time of the country next to coffee with its finished and semi finished leather products.1 Although the number of tannery involved in production of this products increasing from time to time, the sectors and the country are losing revenue due to decline in leather quality and fall in export price.3 Of the total skin processed of tanneries, one fourth to one third of it is unsuitable to export due to various defects, 65%, which occur in pre-slaughter, stage.4 The existence of various skin diseases (Dermatophillosis, Demodicosis, Sarcropte and psoroptes mange, ticks and lice infestations affecting cattle, sheep and goats are frequently reported from different parts of Ethiopia.2 These different diseases in Ethiopia are documentable for considerable economic losses culling and occasional mortalities and related with cost of treatment and prevention disease.2 The potential economic losses necessitate the nationwide investigation on the distribution of skin disease and organize efforts between farmers, trader, tanners and government to at least minimize these enormous losses. Hence in socio–economically important city like Kutaber words so far limited studies has been made to investigate the overall prevalence of the skin diseases in domestic ruminants. Therefore, the objectives of these studies are:

To identify the major skin diseases of cattle, sheep and brought to kutaber Veterinary clinic.

To assess and qualify associated risk factors (breed, Age and Sex) of the study animals.

To recommend possible control measures.

Materials and methods

Study area

The study was conducted from September 2016 to January 2017 at kutaber veterinary clinic in kutabre city which is the capital city of Kutaber words, which is 20kms far in West of Dessie. It is located at 13°32’ North latitude and 39°33’ East longitude and situated on the elevation of 2084meters above sea level. It receives the annual average rainfall of 600mm and average temperature of 23°c,6 estimated that in Kutber , the farmers had total of 2,713,750 cattle (representing 7% of Ethiopia total cattle), 72,640 sheep (0.42%), 208,970 goat (1.61%), 3,180,240 poultry of all species (10.3%), 32,650 Camels (7.15%), 3,180,240 poultry of all species (10.3%) and 20,480 bee hives (0.47%) of the total of Ethiopian bee hives. In and around Kutaber estimated number of cattle (93,904), sheep, Camel (311), Mule (1,992), Donkey (3,177),goats(9739), hens (41,105) and horse (226) reported by BOARD (2008–2009).

Study animals

From September 2016 to March 2017, a total of 909 cattle, 447 sheep, 306 goats were examined.
sheep and 306 goats brought to Kutaber veterinary clinic were subjected to detailed clinical examination for the presence of skin diseases ticks, lice fleas, mange, dermatophilliosis, pox, contagious ecthymia and the history, breed, sex and ages were recorded. The age of the animals is determined primarily based on history we get from the owner and estimating using the destination formulate described. 9 The animals were divided in to three groups according to their age (less than 1 year), (1 year to 5 year), (more than 5 years).

### Study designs and methodology

A cross sectional was conducted to determine the prevalence of major skin diseases of ruminants. The examination of each animal was conducted by detailed clinical examination for the presence of skin diseases and when skin lesion are evidenced the case history was taken from owner and subsequently skin samples were taken from at least two sites covering the adequate depth peripheral edges. Each animal species was examined singly for one type of skin diseases infection encountered in the study system. In addition samples such as skin scraping hair specimens, pustules and externally visible parasites are collected and subjected to appear laboratory imposition for confirmation. Viral infection like lumpy skin diseases, pox and contagious ecthymia diseases were diagnosed based on their occurrence stock and then observable clinical picture such as wide spread skin lesions on and around the muzzle, ears, scrotum and udder. 10

### Laboratory confirmation

Skin scraping from suspected cases of mange are collected and preserved in 10% formalin after addition of 10% KOH to the specimen; mites may be released from scabs and crusts before examination following procedures indicated. 11 The identification of the mange mites species are based on the morphological characteristics described. 12 The diagnosis of parafillariasis was based on the clinical signs and direct microscopic examination of the oozing blood or exudates from the bleeding points described. Lice and fleas are collected by coat brushing of the affected animals and identification of lice by their characteristics lice described. 13 Ticks were collected from infestation sites by ethyl alcohol (70%) then preserved in 10% formalin and dispatched to laboratory identified in genus level using their characteristics and stereo microscope or light microscope described. 14 For suspected case of dermatophilliosis scabs, pus and exudates was collected giemsa and gram’s stained smears are directly microscopically examined according to the procedure described. 15 The diagnosis of pox diseases was based on observation of pox lesions around the oral cavity and tail region. 16

### Data entry and analysis

The data was entered in Microsoft excel sheet and the data was analyzed using Epi. Info version 3.5.1. The Pearson’s chi-square (x²) test was used to assess difference in the prevalence of skin diseases among breed, sex, and age groups. In all cases 95% confidence intervals and P<0.05 as consider as statistical significance value.

### Result

The prevalence of skin diseases in cattle

The overall prevalence of skin diseases in cattle was 39.38% (358 cases). The major identified skin diseases were ticks (25.41%), pediculiosis (5.28%), mange (5.28%) flea (1.76%), dermatophilliosis (0.88%) and lumpy skin diseases (0.56%). The susceptibility of different age group of cattle to skin diseases is presented in Table1. Young animal were more susceptible to skin diseases than the older one. Statistically significant different was observed between the different age group (P<0.05). Animal less than 1 year age were more susceptible to skin diseases than greater than 5year Table 2 The major identified tick species were, Boophilus (17.75%), Amblyomma (7.48%), Rhipicephalus (7.92), Hayalomma (7.26%) and lice identified was Demalina and linogathus species was 2.2% and 3.08% respectively and demodes 3.85%, Sarcoptes 0.88%, Psoroptes 0.55% in cattle. The prevalence of skin diseases was high in cross breed than local breed and male animals were more susceptible.

### Table 1 Prevalence in % and (number of cases) of skin diseases observed in cattle (n=909) at Kutaber veterinary clinic, South wollo, Amhara region

| Type of skin diseases | Positive case | < 1 year n = 251 | Age 1 – 5 year n = 351 | >5 year n = 307 | Total n = 909 | Percentage % |
|-----------------------|---------------|------------------|------------------------|----------------|----------------|---------------|
| Ticks                 | 231           | 71(28.28)        | 140(39.9)              | 20(6.5)        | 909            | 25.41         |
| Lice                  | 48            | 29(11.6)         | 18(5.12)               | 1(0.32)        | 909            | 5.28          |
| Fleas                 | 16            | 11(4.38)         | 5(1.42)                | 0              | 909            | 1.76          |
| Manage Dermato        | 48            | 6(2.36)          | 39(11.1)               | 3(0.97)        | 909            | 5.28          |
| Phillosis Lumpy skin  | 8             | 0                | 8(2.27)                | 0              | 909            | 0.88          |
| Diseases              | 5             | 0                | 5(1.42)                | 0              | 909            | 0.56          |
| Parafillaria          | 2             | 0                | 2(0.56)                | 0              | 909            | 0.22          |
| Total                 | 358           | 117(46.61)       | 217(61.82)             | 24(7.81)       | 909            | 39.38         |

**Table 2 The overall prevalence of skin in cattle among factor**

| Risk factors | Groups of animals | Result Positive | Negative | Total | Percentage % | P value |
|--------------|-------------------|-----------------|----------|-------|--------------|---------|
| Age          | < 1 year          | 117             | 134      | 251   | 46.61        |         |
|              | 1-5 year          | 217             | 134      | 351   | 61.82        | Significance P < 0.00 |
|              | >5 year           | 24              | 283      | 307   | 7.81         |         |
|              | Total             | 358             | 551      | 909   | 32.19        |         |

**Citation:** Wondmnew K, Hussien M, Temesgen W, et al. Determination of prevalense external parasite on different species. MOJ Proteomics Bioinform. 2018;7(5):263–269. DOI: 10.15406/mojpb.2018.07.00245
Prevalence of skin diseases in small ruminant (sheep and goats)

Prevalence of skin diseases in sheep

Out of 447 sheep which brought to Kutaber veterinary clinic, 194 sheep were suffered to one and more type of skin diseases. The overall prevalence of sheep skin diseases was 43.40%. The major skin diseases examined were tick (29.08%), lice (6.94%), Fleas (4.25%), Demodex (1.12%), mange (2.01) sarcoptes (0.88%) and pox (1.12%) in Table 3,4. This result was lower than the previous study in kombolcha veterinary clinic the prevalence of lice (25.8%), flea (7.9%), Pox (1.6%), Orf (3.2%), Boophilus (3.2%) and Amblyomma (11.6%). The difference was arising from the distribution of disease in relation to agro climate: season of study conducted and the clients develops awareness about skin diseases and treated their animals by brought to near veterinary clinic and the recent drugs which available also effective for most ectoparasites. There was no significance association between age, sex in sheep. Male animals (47.27%), and animals under less than one year (47.5%), were more susceptible to animals when compare to the rest groups of animals. These reports were similar to the previous study. In this study the prevalence of skin diseases was higher in sheep under 1 year and male animals with the prevalence of 47.5% and 47.2% respectively and there were no statistical significance difference among sex and age in sheep.

Prevalence of skin diseases in goats

A total of 306 goats were examined, the overall prevalence of skin diseases was 45.09% in goats individually the prevalence of skin diseases was tick infestation 19.28%, mange 3.26%, lice 3.91%, Pox virus 8.49%, and contagious ecthyma 7.18% in the study area Table 5. In this study the prevalence of overall skin diseases in age categories of goats were 62,28%, 45.78% and 26, 26% in 1‒5year and less than 1year and greater than 5year respectively. Animals which are greater than 5year were not affected by lice and flea. In goats generally the skin diseases not significance between sex. Male animals and animals between the group of 1‒5year were showed high prevalence 48.96% and (62.28%) respectively Table 6.

Table 3 Prevalence in % and (number of cases) of skin diseases observed in sheep (n=447) at Kutaber veterinary clinic, South wollo, Amhara region

| Type of skin | Positive | Age | Sex | Total | Percentage % |
|-------------|----------|-----|-----|-------|--------------|
| Ticks       |          | n<1 year=120 | 1-5 year=196 | >5 year=131 | Male=165 | Female=28 |
| Lice        |          | 19(15.8) | 11(5.6) | 1(0.8) | 18(10.9) | 13(4.6) |
| Flea        |          | 14(11.7) | 5(2.6) | 0(0) | 7(4.3) | 12(4.3) |
| Mange       |          | 1(0.8) | 6(3.1) | 2(1.5) | 4(2.4) | 5(1.8) |
| Pox         |          | 0 | 4(2.1) | 1(0.7) | 2(1.2) | 3(1.1) |
| Total       |          | 194(45.1) | 57(29.1) | 78(39.8) | 59(45.1) | 116(41.1) | 78(47.3) | 447 |

Table 4 The overall prevalence of skin diseases in according age, sex in sheep

| Risk factors | Age group | Total | Positive | Negative | Percentage | P value |
|--------------|-----------|-------|----------|----------|------------|---------|
| Age          | <1 year   | 120   | 57       | 63       | 47.5%      |         |
|              | 1-5 year  | 196   | 78       | 118      | 39.79%     |         |
|              | >5 years  | 131   | 59       | 72       | 45.04%     |         |
|              | Total     | 447   | 194      | 253      | 43.08%     |         |
| Sex          | Male      | 165   | 78       | 87       | 47.27%     |         |
|              | Female    | 282   | 116      | 166      | 41.13%     |         |
|              | Total     | 447   | 194      | 253      | 43.08%     |         |

N.S=No significance
Table 5 Prevalence in % and (number of cases) of diseases observed in goats (n=306) at Kutaber veterinary clinic, South wollo, Amhara region

| Type of skin diseases | Age | Positive case | Total | Sex | Percentage % |
|-----------------------|-----|---------------|-------|-----|--------------|
|                       |     | < 1 year n = 109 |       |     |              |
|                       |     | > 1 year n = 83 |       |     |              |
|                       |     | > 5 year n = 114 |       |     |              |
| Ticks                 | 59  | 9(8.25)       | 23(20.2) | 306 | 19.3         |
| Lice                  | 12  | 4(3.66)       | 0      | 306 | 3.92         |
| Flea                  | 9   | 7(6.62)       | 0      | 306 | 2.94         |
| Manage                | 10  | 1(0.91)       | 2(1.76) | 306 | 3.26         |
| Pox                   | 26  | 10(9.17)      | 1(0.8) | 303 | 8.46         |
| Orf                   | 22  | 7(6.43)       | 3(2.63) | 306 | 7.18         |
| Total                 | 138 | 38(35.78)     | 29(26.26) | 306 | 26.6         |

N. B. Orf means contagious ecthyma

Table 6 The prevalence of skin disease in relation of risk factors (Sex and Age) in goats

| Risk factors | Animals group | Positive | Negative | Total | Percentage % | P value |
|--------------|---------------|----------|----------|-------|--------------|---------|
| Age          | <1 year       | 38       | 45       | 83    | 45.78        | Significance |
|              | 1-5 year      | 71       | 43       | 114   | 62.28        |          |
|              | >5 year       | 29       | 80       | 109   | 26.6         |          |
|              | Total         | 138      | 168      | 306   | 45.09        |          |
| Sex          | Male          | 47       | 49       | 96    | 48.96        | No Significance |
|              | Female        | 91       | 119      | 210   | 43.33        |          |
|              | Total         | 138      | 168      | 306   | 45.09        |          |

Discussion

This study revealed that the diseases caused by parasites, bacteria, viruses and others were common in and around Kutaber Town in Kutaber veterinary clinic. The overall prevalence was 39.38%, 43.40% and 45.09% in cattle, sheep and goats respectively. The high prevalence of skin diseases in animals may be associated with nutritional and climatic stress following repeated drought. Different origin species and species and health status animals were come to in close contact at available communal watering and grazing sites (contact at point) because of feed scarcity, the establishment and spread of ectoparasites and bacterial or viral infections were favored. Furthermore, young animals were significantly more affected than adults P<0.05 has strong association between age, sex and breed and there was significant association P<0.05 between age in goats and no significant association the skin diseases and risk factors in sheep. Among skin diseases, the prevalence of ectoparasites was 37.73%, 42.28% and 26.47% for cattle, sheep and goats respectively. This obtained overall prevalence was relatively higher than the previously study in Adam veterinary clinic.17 This difference may be due to agro climatic condition and health care of the animals or the drug which used to treatment of skin diseases efficacy decrease due to drug resistance development of ectoparasites or skin diseases or used withdrawal drugs. The major identified tick species were Boophilus (17.16%), Amblyomma (7.48%), Rhipicephalus (7.92%) and Hayalomma (7.26%) in cattle. When compare to the previous study this prevalence was higher than reported 6.94% but there was variation in previous prevalence of tick species reported in North Eastern Ethiopia, Kombolcha,16 Amblyomma (27.9%) and Boophilus (11.3%) may be due agro climate variation and season of the study. The prevalence of demodociosis was 3.85%, 1.96%, 1.12%, in cattle, in goats and in sheep. The manage mite infestation (Demodociosis) prevalence registered in the previous study in different parts of the country in ruminants cattle, sheep and goats were 1.88% in cattle, 1.33% in sheep and 1.02% in goats and the prevalence of demodociosis was reported in cattle range from 0.42% in Nekemte region (Regessa, 2003) to 1.63% in Wolaita Soddoo region.19 The frequencies of Demodex in sheep and goats were 0.80% and 1.37% respectively in central Ethiopia, 0.84% and 0.99% in eastern Ethiopia.20 Few number of sarcoptes cases are observed in all ruminants in the study period in the study area with a prevalence of 0.88% (8cases) in cattle, 0.88 (4cases) in sheep and 1.30% (4cases) in goats. In the previous report,21 in kombolcha veterinary clinic the prevalence of sarcoptes scabies was 22.9%, 13.2% and 26.5% in cattle, sheep and goat respectively. Such difference probably agro climate condition, health care awareness of develops in the livestock producers brought to the clinic when health problems occurs and treated early. The prevalence of dematophillosis in cattle was 0.88% in Kutaber veterinary clinic. The dermatophillosis in three species studied 22 1.20%, 0.53% and 0.68% in cattle, sheep and goats respectively and 5.2% in cattle in Northern Ethiopia.23 The low prevalence dermatophillosis may be attributed due to agroclimate changes, season of the study conducted and the management system of animal, but in small ruminants’ null prevalence registered in the study period. Lice infestation was an important skin diseases recorded in both ruminants (cattle, sheep and goats) with a prevalence of 6.94%, 5.28%, 3.92%, in cattle, sheep and goats respectively. The overall prevalence of lice infestation obtained in the study area was relatively higher than in the previous study in central Ethiopia 2%
in sheep and 1.5% in goats,24 in southern rangeland 0.5% in goats (Molu, 2001) and on the other hand the present study prevalence of lice infestation was relatively lower than (39.8%) in sheep and 29.2% in goats in Amhara regional state,25 and around kambolcha 14.2% in goats.26 Such difference in prevalence may arise from different in agro–climate, in season during the study was conducted. Management and health care of sheep and goats in the study area.

Flea infestation was one of skin diseases in countered in the study area in all ruminants with a prevalence of 1.76%, 4.4% and 2.94% in cattle, sheep and goats respectively. In the previous study the prevalence of fleas’ infestation were registered 7.9% in sheep and 1.5% in goats in kambolcha.27 This obtained prevalence was low in sheep and high in goats. Such difference of prevalence may be the health care of animals or agro climate. In the present study the prevalence of lumpy skin diseases in Kutaber veterinary clinic was 0.55%, this prevalence was low compared to the previous report. Whereas lumpy skin diseases was rarely observed in cattle (0.68% 4cases), no documented report of lumpy skins is except the only report of (27.91%) in and around wollo south west Oromia. This may be agro climate changes, season of study or etiological agent access to enter to the host. The prevalence of contagious ecthyma in small ruminants was 2.79% in comparison with the previous study conducted,28 27.91% and (Regassa, 2003) 7.02%, low, probably because of the vaccination program against to this diseases give first before the beginning of this study. On the other hand, the prevalence of pox virus disease observed in this study was 8.49% in goats and 1.12% in sheep, relatively more elevated compared to other studies, who reported 1.53% in sheep and 1.62% in goats, but far lower than that reported,29 (22% in sheep and 18.5% in goats and 1.6% in sheep and 4.5% in goats reported by (Berechetessa, 2008). The variation of prevalence may be epidemiological factors or agro climate changes, season of study conducted and the animal health management. Other skin diseases which cause skin damaged or reduction or skin and hide quality (such as wart, ironing or branding) were observed and branding of animals for different purpose traditional treatment, identification cause high damage of skin and hide or reduction of skin or hide quality. Even though the study was limited to group of animals brought to the mentioned veterinary clinic, the prevalence of different skin diseases in these domestic ruminants suggest the importance of these diseases in reducing the production and productively of domestic animals. Kuterab is one of the biggest animal marketing site and route in dissemination of skin diseases should be underlined. Considering the importance of skin and hide as main source of foreign currency to the country, the prevailing skin diseases and ectoparasites mainly in different age groups of these domestic ruminants reared in and around Kutaber town requires attention in order to minimize the spread of infestation and increase income earnings of farmers and small scale holders whose livelihood is dependent on their animals.

Annexes 1–5.

Annex 1 Determining the age of the goats

| Age group | Teeth condition |
|-----------|-----------------|
| Kid under 1 year | eight sharp teeth |
| Year ling (1–2 year) | Central pair of body teeth replaced by permanent ones |
| Young adult 3–4 year | Four permanent teeth |
| Adult 4–5 year | Eight permanent teeth |
| Older adult > 5 year | Worn teeth and some missing |

Annex 2 Estimation of the age of sheep

| Permanent incisor | Age of sheep |
|-------------------|--------------|
| None | < 1 year and 3 month |
| 1 pair | 1 year and 3 month up to < 2 year and 10 months |
| 2 pair | 1 year and 10 month up to < 2 year and 4 months |
| 3 pair | 2 year and 4 month up to 3 year |
| 4 pair | more than 3 year |

Annex 3 Age estimation of the cattle

| Teeth | Eruption | Neck visible and emerged from the gum |
|-------|----------|-------------------------------------|
| 11    | 1½ years | 6th year |
| 12    | 2 year – 2½ | 7th year |
| 13    | 3 year | 8th year |
| 14    | 3½ year – 4 year | 9th year |

All incisors erupt > 5

Annex 4 Methods of data collection recorded in prevalence of major skin disease of cattle in Mekelle veterinary clinic

| S. No | Age | Sex | Breed | Type of skin diseases examined |
|-------|-----|-----|-------|--------------------------------|
| 1     | <1 year | F | Cross | Flea | Manage | Dermatophilosis | Parafilarious | Lice |
| 2     | 1–5 year | M | Local | Tick | Manage | Dermatophilosis | Parafilarious | Lice |
| 3     | >5 year | F | Cross | Flea | Manage | Dermatophilosis | Parafilarious | Lice |

Annex 5 Methods of data collection recorded in prevalence of major skin disease of small ruminant in Mekelle veterinary clinic

| Sr. no | Species | Sex | Types of skin diseases |
|--------|---------|-----|------------------------|
|        | Sheep   | Male | Tick | Lice | Flea | Manage | Pox | Orf | Other |

Citation: Wondmnew K, Hussien M, Temesgen W, et al. Determination of prevalense external parasite on different species. MOJ Proteomics Bioinform. 2018;7(5):263–269. DOI: 10.15406/mojpb.2018.07.00245
Conclusion and recommendations

Tick infestation, mange, lice, flea dermatophillosis and viral diseases like lumpy skin diseases, pox virus and contagious ecthyma have been found the major skin diseases in the study area, suggesting that importance of these diseases in the words, but most of ectoparasite and others skin diseases are can be easily controlled by proper management. In Ethiopia skin and hide production is one of the main sources of foreign currency, yet the amount of hide and skin rejected is increase and their quality also reduce due to these skin diseases control failures or poor management and health care of these animals or ruminants. Based on the above point in consideration the following points are forwarded. Detailed epidemiological study of the skin diseases should be conducted to identify the major skin diseases and their predisposing factors at words level to implement efficient control program. To combat the skin diseases problem and reduce skin damage appropriate control program should be implemented in near future. This control program should be based on food epidemiological knowledge of the disease in the area. The control program should involve farmers, Tanneries, Government, veterinarian and other control bodies. The government should have extended extension education program for livestock producers’ in the region to improve animal management program and control of skin diseases.29,30

Acknowledgments

First of all, my deepest gratitude goes to the Almighty God Allah (S. W) with out whose help I would not take a simple step for forwards the completion of year.

I would like to express my deep heart full pleasure to my advisor Dr. Enquebaher Kassaye for his devotion of his time to correct this paper and provide materials.

I would like also express my deepest heartfelt application and thanks to Mekelle University workers especially Dr. Selamawit T., Ato Natnael T., Ato Kidaney G., and college of veterinary medicine staffs.

Much of my thank goes to the board of external examiners for devoting their time to evaluate this paper.

My special word of thanks goes to my parents for their unlimited and unevaluated help throughout my long study. I would like to dedicate this script my family Ato Hussien Beshier my dad, my Mama Kasich Belayneh all brothers and sisters and my family who support and financial information stay beside me until this long journey next to Allah (S.W).

Lastly, but not the least I want to thank all my class friends which help me in different ways specially, Seid Y, Kassim M. Alisedman, Sumya Z, Mohammed S., Mesfin B., Tewodross G. and Alemu A., Tadesse B., Tarekegn T. and all 5th year and forth year students.

Conflict of interest

This thesis presents works carried out by myself and doesn’t incorporates without acknowledgement any material previously for a degree or diploma in any university. To the best of my knowledge it doesn’t contain any material previously published or written by another person except where due reference is made in the text and all substantive contributions by others to the work presented, including jointly authored publication is clearly in the acknowledgement.

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