Appendix
PUBLIC AWARENESS ABOUT HYDATID DISEASE
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Human being the supreme of animal Kingdom is parasitized by at least 130 organisms which not only get the food and shelter but also cause different types of infectious diseases.

In Kashmir Valley, the people know about some parasitic diseases such as Ascariasis (caused by Ascaris lumbricoides), Amebic dysentery (caused by Entameoba histolytica), Taeniasis (caused by Taenia saginata), etc. But they are not familiar with Zoonotic diseases - the diseases which are basically confined to other animals and human beings acquire them naturally from an infected animal.

Among various Zoonotic diseases, Echinococcosis or hydatid disease is a very fatal and dreadful disease which is prevalent in many areas of Kashmir Valley.

WHAT IS HYDATID DISEASE?

Hydatid disease in humans and livestock results from being infected with the larvae (a developing phase) of the dog tapeworm Echinococcus granulosus. The tapeworm which is 6mm in length lives in the small intestines of dog and discharge 120 million eggs every week or even more along with the stool. These eggs are resistant to temperature from 30 to 38°C.

These eggs are ingested by herbivorous animals like sheep, goat, cattle etc while grazing in the pasture and humans beings may also ingest them accidentally. After ingestion, they hatch in the duodenum (Upper part of small intestine). The embryo bore the mucosa of intestine to enter into portal blood circulation from where they get distributed to various body organs especially liver, lungs, heart, eyes, brain etc. Wherever the embryo settles, it forms a hydatid...
cyst, which takes the shape of a hollow bladder. This condition is known as cystic hydatid disease. The presumptive adult stage in the form of numerous scolices develops within the hydatid cyst and the life-cycle is completed when this cyst is ingested by dogs. As the dogs have no access to the hydatid cyst developed in the viscera of man, the life-cycle of the parasite comes to a dead end. The natural cycle is thus maintained by other hosts like sheep, goat etc.

**HOW DOES HYDATID DISEASE SPREAD?**

Although the hydatid disease is world-wide in distribution due to the adaptability of these parasites to an unusually wide variety of host-species, it is most commonly found in those countries where sheep and cattle raising constitutes an important industry and consequently there is a close association between man, sheep and dog.

"Given a country", says Dr. Davies Thomas, "with many sheep and the organs of which are often eaten raw by the dogs. If water supply be scanty and procured from bogs, swamps, water holes and dams, on the banks of which dogs may deposit their eggs to be blown in by the winds and washed in by the rains, there be dogs in abundance, we have all the conditions necessary for the spread of the disease".

Open & unprotected slaughtering are the main factors for the spread of hydatid disease.

The above mentioned factors described by Dr. Davies, that have a favourable influence on the occurrence and spread of the hydatid disease are also abundantly prevalent in our Kashmir Valley. In Kashmir Valley, there is no dearth of stray and ownerless dogs. These dogs have free and easy access to most unhygienic and unprotected slaughter houses. The butchers give raw offal to dogs and there is an unhygienic habit with the people of Kashmir Valley to throw away the infected dead animals in nearby open fields where stray dogs can get infection easily. These factors have a favorable influence on the occurrence and spread of hydatid disease. If the conditions prevail the incidence of infection can rise to high level in certain endemic areas.
MODE OF INFECTION TO HUMANS.
Humans are usually exposed to these eggs in following ways.
1) By directly ingesting food items (especially vegetables in form of salad) or drinking water that is contaminated with stool from an infected dog.
2) By petting or having other contact with dogs that are infected. These pets may shed the eggs in their stool and their fur may be contaminated. They may also contaminated other objects such as harneses or leashes, which can also spread infection.

HOW SOON AFTER EXPOSURE DO SYMPTOMS APPEAR?
The development of hydatid cyst is very slow and at the end of the year, it is approximately 4cm in diameter. Due to its slow growth, the disease remains latent (asymptomatic) for many years. Symptoms usually reflect the size and locations of the cysts. As the cyst enlarges, it may exert pressure effects on the surrounding tissue. The symptoms of the disease may occur due to the complications of hydatid cyst. When the hydatid cyst is present in lungs cough and haemoptysis may occur; upper abdominal pain, a palpable mass or hepatomegally and less commonly jaundice are usual presentation symptoms in case of hepatic cyst; osseous cysts, particularly those present in the cavities of long bones, are often diagnosed only following a pathological fracture. The presence of the cyst in the brain or eyes may prove fatal. When the cyst ruptures, the cystic fluid may cause anaphylactic shock in which the patient may die.

HOW IS HYDATID DISEASE DIAGNOSED?
The diagnostic techniques used in hydatid disease at present include a battery of Immunological and radio-imaging techniques.
Among radio-imaging techniques, sonography and computerized tomography (CT Scan) have proved a value in different circumstances. Plain X-ray chest and abdomen also finds a place especially when calcification is present.
Over the years various immunological techniques have evolved from intradermal test to recent indirect haemagglutination test (IHA), immunofluorescent antibody test (IFA) and enzyme-linked immunoserbent assay (ELISA). Combination of these immunological techniques usually have 100% diagnostic accuracy.

HOW IS HYDATID DISEASE TREATED?
Surgery is the most common form of treatment for hydatid disease. Removal of the cyst may not be 100% effective, and medication may be necessary to prevent the development of secondary cysts. For this purpose Albendazole, a benzimidazole compound has been used successfully.
HOW CAN HYDATID DISEASE BE PREVENTED?

Hydatid disease is a public health problem that theoretically is preventable. In Hydatid disease, successful control requires the breaking of the life-cycle between dog and sheep, goat etc. There are two main control measures available.

A) First, most control authorities regard the prevention of dogs gaining access to raw offal as a fundamental measure for the control of hydatid disease. The methods that can be applied are:

   a) Safe slaughtering of animals
   b) Prevention of illegal slaughtering
   c) Disposal of carcasses (leaving dead carcasses and offal in the field should be made a legal offence. The owner should be encouraged to burn or bury them immediately)

   AVOID DISPOSAL OF DEAD CARCASSES IN OPEN FIELD

B) The second important measure is the reduction of the parasite biomass. The methods that can be applied are:

   a) Elimination of dogs in selected areas
   b) Mass treatment of dogs

PERSONAL PROPHYLAXIS

As it is established fact that prevention is better than cure. So we must have to adopt the following measures to save ourselves from this fatal and dreadful disease.

1) Avoid keeping of dogs as pets, as in hydatid disease dog is the most important animal from the etiological point of view.

   In the Hadith (saying of Prophet Muhammad SAW) the following are among several recorded statement about the undesirability of close contact with dogs:

   "If a dog drinks from your vessel, you must wash the vessel seven times, "Angles do not enter a house where there is a dog"

2) Do not eat fruits or vegetables picked directly from ground without careful washing or cooking.
Publications
&
Presentations
Prevalence of Hydatid disease in slaughtered animals in Kashmir Valley

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Hydatidosis is a serious zoonotic disease of global dimensions and has great importance in agriculture based countries with a large rural population. In India, and for this matter, the entire sub-continent, ideal conditions exist for establishment, propagation and dissemination of hydatidosis both in man and live-stock. Yet, some standard text books do not mention India as one of the countries where hydatidosis is widely prevalent because the exact status of hydatidosis in India is far from clear except for a few periodic surveys on prevalence in animals which are reported from some parts of India like Punjab (Gill and Rao, 1967; Deka et al., 1983), Bihar (Pandey, 1971), Bangalore (Ilegde et al., 1975), Jaipur (Mathur and Khanna, 1977), Uttar Pradesh (Deka et al., 1983, Singh et al., 1988; Varma and Ahluwalia, 1990, Deka and Gaur, 1998, Varma and Malviya, 1998), Delhi (Rama et al., 1986), North East India (Roy and Tandon, 1989), Himachal Pradesh (Jithendran, 1996), Calcutta (Das and Das, 1998), Pondichery (Das and Srikrishna, 1998) and Guwahati city (Sharma et al., 2000). Though the infection in human subjects has been reported from Kashmir valley (Chishti et al., 2001), there appears to be no documented information on the prevalence in animals. The present study deals with the prevalence of hydatidosis in slaughtered animals in Kashmir valley

MATERIALS AND METHODS

From August, 2001 to July 2002, the viscera of various slaughtered animals were examined at different abattoirs of Kashmir valley. Necropsies of animals were observed on the spot to collect the hydatid cyst from different organs of animals. On collection, the cysts were brought to the laboratory in ice. The cystic fluid was aspirated, centrifuged and
then the sediment was examined under the microscope for the presence of brood capsules and protoscoleces to ascertain the fertility of the cysts.

RESULTS

The prevalence of hydatid disease was investigated in 57 cattle, 200 sheep, 76 goats and 25 buffaloes slaughtered at different abattoirs in Kashmir valley from August, 2001 to July 2002. The overall percentage infection of hydatid disease was 38.59, 26.00, 14.47 and 8.00 in sheep, goats, cattle and buffaloes respectively. The sex of the animal was found to have no effect on the prevalence of hydatid disease.

The organ-wise distribution of hydatid cysts (Table-1) showed that simultaneous involvement of both lung and liver was more frequent in sheep (71.15%) and goats (54.54%). In cattle, lungs (63.63%) showed comparatively higher infectivity than liver. Right basal lungs were more infected than the left ones. Spleen, kidney and heart of cow were only exceptional organs for the presence of hydatid cysts. In buffaloes, 100% infection was observed in lungs.

Fertility of hydatid cyst was highest in sheep (98.38%), followed by buffaloes (50%), goats (27.27%) and the least was in cattle (9.09%).

DISCUSSION

In the present study, 38.9% cattle, 26% sheep and 14.47% of goats were found to be infected with hydatid cysts. The present study revealed that there was a significant difference in the prevalence of hydatid disease in Kashmir valley as compared to other parts of the country and world. The percentage of infection given by other observers is compared in Table 2.

It is evident from the figures (Table 2) that some results are very low as compared to our results and on the other hand, some are high. These findings support the view that infection rates may vary from place to place depending on epidemiological factors. According to Chatterjee (1980), hydatid disease is most commonly found in those countries where sheep and cattle constitute an important industry and consequently, there is a close association between sheep and dog. It is more a disease of temperate climates than of tropical areas. In Kashmir valley, all the necessary conditions for the spread of disease are present i. e., the climatic conditions are temperate. 75 percent of the population belongs to rural areas and moreover, majority of the people in rural areas depend partly on cattle and
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Year</th>
<th>Location</th>
<th>Percentage of Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. D. D.</td>
<td>2002</td>
<td>South Africa</td>
<td>13.3%</td>
</tr>
<tr>
<td>A. B. T.</td>
<td>1996</td>
<td>India</td>
<td>0.6%</td>
</tr>
<tr>
<td>West Bengal (India)</td>
<td>2000</td>
<td></td>
<td>3.3%</td>
</tr>
<tr>
<td>A. I. V. A.</td>
<td>1996</td>
<td>Indonesia</td>
<td>0.6%</td>
</tr>
<tr>
<td>A. I. V. A.</td>
<td>1996</td>
<td>Philippines</td>
<td>0.6%</td>
</tr>
<tr>
<td>Jordan</td>
<td>1997</td>
<td>Jordan</td>
<td>0.6%</td>
</tr>
<tr>
<td>Das S. R.</td>
<td>1997</td>
<td>India</td>
<td>0.6%</td>
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<td>Das S. R.</td>
<td>1997</td>
<td>India</td>
<td>0.6%</td>
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<tr>
<td>Das S. R.</td>
<td>1997</td>
<td>India</td>
<td>0.6%</td>
</tr>
</tbody>
</table>

Table 1. Table showing prevalence of hydatidosis in animals of Kashmir Valley.

Table 2. Complete table showing prevalence of hydatidosis according to various authors in different parts of the world.

- Figures in parentheses indicate percentage of adult cysts.
sheep breeding. Besides, the Gujjar and Bakerwal communities, whose main occupation is sheep and cattle rearing and farming, their animals are guarded and worked by dogs. This may be a reason for high prevalence of hydatid disease in Kashmir valley.

In the present study, cattle were more infected than sheep and goats because cattle of older age groups are generally slaughtered in comparison to sheep and goats which are slaughtered at an early age (between 1 to 2 years). The prevalence of infection appears to increase with age in all animal species, reflecting no doubt an extended period of exposure to contaminated environments.

The present findings of hydatid infection in buffaloes indicated low (8%) infection rates than those reported by Deka et al. (1983), Das and Das (1998), Bhattacharya et al. (2000) and Sharma et al. (2000). In Kashmir valley, the buffaloes are rarely domesticated because the climatic conditions are not suitable for their propagation. They are mainly brought from warmer states especially Punjab and Rajasthan to Kashmir for slaughtering and therefore, the prevalence of hydatidosis in buffaloes is low in comparison to local animals.

In the present study, the organ-wise incidence indicated that hepatic cysts were more common than pulmonary cysts in sheep and goats. Besides, in 71.15 percent cases, pulmonary and hepatic cysts co-existed in the same animal. Hydatid cysts have been recorded in practically every tissue of the body. Transport of embryos by means of blood circulation appears to explain all the facts concerning the cyst tissues. In the cattle and buffaloes, isolated pulmonary cysts were more frequent without the involvement of liver and other organs. It was observed that right basal lung was more affected than the left lung in all the cases. Similar findings were also reported by Das and Das (1998) and Abo-Risha (1999). This increased incidence in the lungs may be because the cattle and buffaloes may have inhaled the ova through nasal tract while grazing. The earlier belief that the larvae were released only when their cyst wall was digested by the gastric secretion and that they travelled to the lungs through the blood stream is no longer tenable. It has been shown that the larva may reach bronchus directly and then form a cyst there (Pitch and Wilson, 1973). This inhalation theory was first given by Deve in 1904. Deve introduced some ova of *Taenia* and *Echinococcus* into the trachea of rabbit kept under rigid experimental conditions and 9 months later found a typical hydatid cyst in the right lung. Another theory given for isolated pulmonary hydatid cyst is the journey of hexacanth embryo from the gut to lungs through lymphatics. The inhalation theory of lung hydatids can most probably explain the preponderance of basal involvement. The ova being heavier fall to the base and the right lung base because of the straighter course of the right bronchus.
In the present study, fertility of hydatid cyst was highest in sheep (98.36%) and least in cattle (9.09%). Similar observations have been reported by Hosseini (1997), Deka and Gaur (1998), Bhattacharya et al. (2000) and Saeed et al. (2000). And according to Biocca and Massi (1951), the low fertility rate of hydatid cysts in cattle seems to be indicative of a relatively unfavourable host-parasite relationship. Due to the high fertility rate of sheep hydatid cysts they are considered to be the best disseminators of hydatid disease in Kashmir valley.

SUMMARY

The prevalence of hydatid disease was investigated in 57 cattle, 200 sheep, 76 goats and 25 buffaloes slaughtered at different abattoirs in Kashmir valley during August 2001 to July 2002. The overall percentage infection rate of hydatid disease was 38.59, 26.00, 14.47 and 8.00 in cattle, sheep, goats and buffaloes respectively. Lungs and liver were the common sites for hydatid cysts but spleen, kidney and heart were also involved in some animals. Fertility of hydatid cyst was highest in sheep (98.38%), followed by buffaloes (50.0%), goats (27.27%) and least in cattle (9.09%). Due to high fertility rate of hydatid cysts in sheep, they were considered to be the best disseminators of hydatid disease in Kashmir valley.

REFERENCES


Abstract: The present study was undertaken to evaluate the prevalence of hydatid disease in human population of Kashmir valley from 1998 to 1999. A total of 170 patients were found positive for hydatid disease during this period. Majority of the patients, who had contracted this disease (84.11%), belonged to rural areas. Most affected area identified in this survey was district Anantnag (26.47%) followed by district Pulwama (21.76%). Sixty percent of the patients positive for disease were males and forty percent were females. The maximum incidence of the disease was in the second, third and fourth decade of life. Liver was the commonest organ involved in 108 cases (63.52%). Out of these, isolated liver involvement was present in 90 cases (52.94%), while simultaneous involvement of liver with other organs was seen in 18 cases (10.58%) followed by lungs in 77 cases (45.29%).

Key words: Helminth, Echinococcus; Epidemiology, Kashmir

Introduction

Hydatidosis (Hydatid Disease) is one of the most serious helminthic zoonosis. It is caused by infection with the post larval, metacestode stage of the dog tapeworm, Echinococcus, which belongs to the family Taeniidae.
It is more a disease of temperate climates than of tropical areas (Chatterjee, 1980).

In India, and for this matter, the entire subcontinent, ideal conditions exist for establishment, propagation, and dissemination of hydatidosis both in man and live stock. The exact status of hydatidosis in the Indian subcontinent, however, is far from clear except periodic surveys on prevalence in animals and occasional clinic reports in humans.

In Kashmir, the climatic conditions being temperate, sheep and cattle raising forms an important industry. The hydatid disease is not an uncommon problem in Kashmir valley. However, no work has been done so far to find the incidence of the disease. With this background the present study was undertaken to evaluate the prevalence of the disease in various areas of Kashmir valley.

Material and Methods

In order to evaluate the prevalence of the disease a survey was conducted in different areas of all the districts of Kashmir valley from 1998 to 1999. The people were aware about the disease, its mode of transmission and signs and symptoms. The diagnosis of the disease among the selected people, which showed any sign and symptom related to hydatid disease was substantiated serologically by doing Casoni’s intradermal test. For Casoni’s intradermal test a 0.2 ml of fresh sterile human hydatid cyst fluid (HHCFC) antigen was injected intradermally into the forearm of the patient. Sterile normal saline of 0.2 ml was injected in the other arm for control. Wheels were measured after 30 minutes and a wheel area of more than 1.2 cm was considered positive.

The cases, which were positive for Casoni’s intradermal test, were advised to undergo for further serological and radiological investigations for confirmation. Besides during that period, the patients of hydatid disease admitted in various surgical wards of Sher-i-Kashmir Institute of Medical Sciences and SMHS Hospital Srinagar were also regularly observed.

Observation and Discussion

During the period of one year (1000 people were tested (150 people in each district), and a total of 60 persons (6.7%) were found infected with hydatid disease.
Table 1. District wise distribution of 60 patients infected with hydatid disease.

<table>
<thead>
<tr>
<th>Districts</th>
<th>No of infected persons</th>
<th>%age of infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anantnag</td>
<td>20</td>
<td>13.33</td>
</tr>
<tr>
<td>Pulwama</td>
<td>15</td>
<td>10.00</td>
</tr>
<tr>
<td>Baramulla</td>
<td>10</td>
<td>6.67</td>
</tr>
<tr>
<td>Srinagar</td>
<td>07</td>
<td>4.67</td>
</tr>
<tr>
<td>Budgam</td>
<td>05</td>
<td>3.33</td>
</tr>
<tr>
<td>Kupwara</td>
<td>03</td>
<td>2.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60</strong></td>
<td><strong>6.67</strong></td>
</tr>
</tbody>
</table>

Table 2. District wise distribution of 110 patients infected with hydatid disease

<table>
<thead>
<tr>
<th>Districts</th>
<th>No of infected persons</th>
<th>%age of infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anantnag</td>
<td>25</td>
<td>22.73</td>
</tr>
<tr>
<td>Pulwama</td>
<td>22</td>
<td>20.00</td>
</tr>
<tr>
<td>Baramulla</td>
<td>22</td>
<td>20.00</td>
</tr>
<tr>
<td>Srinagar</td>
<td>20</td>
<td>18.18</td>
</tr>
<tr>
<td>Budgam</td>
<td>14</td>
<td>12.73</td>
</tr>
<tr>
<td>Kupwara</td>
<td>7</td>
<td>6.36</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>110</strong></td>
<td><strong>12.22</strong></td>
</tr>
</tbody>
</table>

Regional Distribution

During that period, 110 cases of hydatid disease were also managed by different surgical wards of SKIMS, Srinagar and SMHS Hospital Srinagar. Thus, a total of 170 patients of hydatid disease were observed during the period, which formed the basis of our study. The various observations recorded from these 170 patients were as under.

The incidence of hydatid disease in various districts of Kashmir valley is tabulated below.
Table 3. District wise distribution of 170 patients.

<table>
<thead>
<tr>
<th>Districts</th>
<th>No. of patients</th>
<th>%age of infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anantnag</td>
<td>45</td>
<td>26.47</td>
</tr>
<tr>
<td>Pulwama</td>
<td>37</td>
<td>21.76</td>
</tr>
<tr>
<td>Baramulla</td>
<td>32</td>
<td>18.82</td>
</tr>
<tr>
<td>Srinagar</td>
<td>27</td>
<td>15.88</td>
</tr>
<tr>
<td>Budgam</td>
<td>19</td>
<td>11.88</td>
</tr>
<tr>
<td>Kupwara</td>
<td>10</td>
<td>5.88</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>170</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

145 patients (84.11%) belonged to rural areas of the Kashmir valley, thereby showing that the disease is more prevalent in rural areas than urban areas. Similar observations have been put forth by Canda and Canda (1992), Ernest, et al. (1994). The higher prevalence of disease in rural areas may be due to lack of proper hygienic conditions. The questionnaire data collected from these patients showed that they were not familiar with the disease, its mode of transmission and the causative organism. In the rural areas, the slaughterhouses are unhygienic and unprotected, where dogs have an easy access. The butchers gave raw offal to dogs. Besides, there is an unhygienic habit with the people of rural areas to throw away the infected dead animals in nearby open fields where stray dogs can get infected easily. These factors have a favourable influence on the occurrence and spread of the disease in rural areas. If the conditions prevail the incidence of infection can rise to high level in certain endemic areas.

**Sex- Distribution**

Out of 170 patients, there were 102 (60%) male and 68 (40%) females.
This indicates that males were more prone to infection than females. Similar observations have been made by Barnett & Thomas (1952), Deyeloux et al. (1991) and Ivanov (1996).

According to Willson (1949), the frequency of involvement of male and female patients will vary from place to place, depending upon the hygienic status of the population and the local habits of the people. The infection is acquired in childhood and since the habits of both male and female children are almost same, and at the same time lack hygienic principles, equal infection of male and female patients is expected.

However, in rural areas of Kashmir valley the male children remain more out-door as compared to female children and take the job of rearing of the domestic animals. Therefore, males are more susceptible to infection than females.

**Age-distribution**

The maximum incidence of the disease was in 2nd, 3rd and 4th decade of life as shown in Table 4. In this series, the minimum age was 5 years and maximum age was 65 years.

<table>
<thead>
<tr>
<th>Age in years</th>
<th>No. of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>15</td>
<td>8.82</td>
</tr>
<tr>
<td>11-20</td>
<td>56</td>
<td>31.76</td>
</tr>
<tr>
<td>21-30</td>
<td>41</td>
<td>24.11</td>
</tr>
<tr>
<td>31-40</td>
<td>32</td>
<td>18.82</td>
</tr>
<tr>
<td>41-50</td>
<td>15</td>
<td>8.87</td>
</tr>
<tr>
<td>51-60</td>
<td>9</td>
<td>5.29</td>
</tr>
<tr>
<td>60-70</td>
<td>4</td>
<td>2.38</td>
</tr>
</tbody>
</table>
Most extrahepatic hydatid cysts manifest at an early age and hepatic hydatid cysts manifest in later stages. This is because the type of tissue is an important factor for the growth of the cyst. The hepatic cysts are slow-growing, majority of them are asymptomatic and show symptoms till they reach 6 to 8 inches in diameter (to produce discomfort and a palpable lump), a size which at the ordinary rate of growth can be reached only in from 20 to 30 years of age. The hepatic cyst being slow to grow takes years together to develop into palpable cysts. At the same time slow growth of cyst gives the liver sufficient time for compensatory hypertrophy, so that there is no liver dysfunction and there is no deviation from normal in the general health of the patient. That is why hepatic hydatid is present at a later stage even if the infection is acquired in the childhood, while the lungs, being soft and vascular, show a fast and regular growth of hydatid cyst. Therefore, extrahepatic cysts especially in lungs manifest at an early age because of the rapid development of cyst producing symptoms which make the patient to seek medical advice at an early age. Age distribution in our study is in accordance with Methuselvan, (1977), Irshadullah et al., (1989), Amr et al., (1994), Ernest et al., (1994) and Ivanov, (1996).

Distribution of Hydatid Cysts by Site.

As shown in Table 5, liver was the commonest site involved in 108 (63.52%) cases followed by lungs 65 (45.29%).

Table 5. Distribution of cysts by site.

<table>
<thead>
<tr>
<th>Organ</th>
<th>No. of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liver (isolated)</td>
<td>90</td>
<td>52.94</td>
</tr>
<tr>
<td>Lungs (isolated)</td>
<td>65</td>
<td>35.29</td>
</tr>
<tr>
<td>Liver and lungs</td>
<td>12</td>
<td>7.05</td>
</tr>
<tr>
<td>Liver and spleen</td>
<td>4</td>
<td>2.35</td>
</tr>
<tr>
<td>Liver and peritoneum</td>
<td>2</td>
<td>1.17</td>
</tr>
<tr>
<td>Spleen</td>
<td>1</td>
<td>0.54</td>
</tr>
<tr>
<td>Ovary</td>
<td>1</td>
<td>0.54</td>
</tr>
</tbody>
</table>
These figures are in agreement with Dew (1928) and Kattan (1977). Hydatid cysts have been recorded in practically every tissue of the body. Transport of the embryo by means of circulation appears to explain all the facts concerning the cyst distribution. After ingestion of ova, the hexacanth embryo bores its way into the portal circulation and is carried to the liver, which is the first filter or “hepatic filter.” Some of the embryos manage to escape the liver and reach the lungs, the second filter or “pulmonary filter.” From the lungs the embryo reaches the left part of the heart via pulmonary veins and is then distributed to all the organs of the body, the final filter or “peripheral filter.” There is no reason to believe that in peripheral filter one organ or tissue will be more affected than the rest. In the peripheral filter all tissues equally host the hexacanth embryo.

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EPIDEMIOLOGY OF HYDATIDOSIS IN HUMAN POPULATION OF KASHMIR VALLEY

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During the survey made between 1998-1999 in different areas of Kashmir valley a human population of 900 belonging to particular area was tested for hydatidosis and out of these 170 patients of human hydatidosis were observed. Majority of patients were from rural areas (89.11%). Males (60.00%) showed higher infection when compared to females (40.00%). The maximum incidence of the disease was seen in 2nd and 3rd decade of life. The most common organ involved was liver (63.52%) followed by lungs (45.29%). Various serological tests were employed for determining the disease followed by X-ray for confirmation. The histopathology in certain cases revealed the damage to the adjoining tissues of the organs they lodged. In all the cases surgery was employed for removing the hydatid cyst.

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ROLE OF HOST SEX, SIZE AND SEASON IN ANTHOCEPHALAN INFECTION OF STONE LOACH NEMACHILUS KASHMIRIENSIS HORA

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During the year long study 309 fishes were examined for the helminth infection. Two species of acanthocephala Neochromadorhynchus and Pomphorhynchus kashmiriensis 1941 were recovered throughout the year. N. manasbalensis was the dominant species with annual percentage of infection 42% and with a total of 502 worms. As compared P. kashmiriensis had a low prevalence (8.23%) and low worm burden (44). Maximum infection (61.44%) was experienced in winter in the former parasite while a clear seasonal pattern was not evident in the latter due to the lower number of parasites and
SOUVENIR AND ABSTRACTS
National seminar on Recent Research Trends in Life Sciences
August 26-28, 2002

Organised by
Centre of Research for Development
The University of Kashmir, Srinagar-190006

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Science and Technology Dept. (J & K Govt.)
J & K Academy of Sciences and the University of Kashmir
*Peronospora destructor* causing downy mildew of onions initially appears as pale green elongated spots or lesions of variable size on young leaves. The severely infected leaves shrivel, collapse and finally die. Humid conditions play a vital role in sporulation. The onion bulb may be induced to sprout prematurely in storage. Lemon shaped papillate sporangia on sporangioaphore is a common feature. These measure variously. Application of Canta as chemical control measure on downy mildew of kales and onion proved to be as most effective fungicide for both the vegetables as compared to Captan and Carbendazim. It showed protective and curative effects against pathogens.

3.23 Pulmonary Hydatidosis- an Experience with 71 Patients at Sher-i-Kashmir Institute of Medical Science, Soura, Srinagar

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During the period of one year (January, 1998 to January, 1999) 71 patients in surgical ward of Cardio Vascular and Thoracic Surgery at Sher-i-Kashmir Institute of Medical Science, Soura, Srinagar, were admitted for surgical treatment of pulmonary hydatidosis. A thorough and detailed history of every patient was taken. Out of 71 patients, there were 40 males (56.34%) and 31 females (43.66%). The maximum incidence of the disease was in 2nd and 3rd decade of life. Right lung was involved in 43 cases (60.56%), left lung in 26 cases (36.62%) and bilateral involvement was in 2 cases (2.82%) 50 patients (70.42%) were presented with recurrent attacks of cough, 46 patients (64.78%) with haemoptysis, 38 patients (53.33%) with chest pain and 20 patients (28.16%) with expectoration.

3.24 Comparative Analysis of *Adenoscolex* (Cestoda) Infections in Indigenous and Exotic Fish of River Jhelum, Kashmir

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Srinagar -190006
Sixteenth National Congress of Parasitology
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31st Oct. to 2nd Nov., 2002
Theme: Recent Trends in Parasitology

Abstracts

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PREVALENCE OF HYDATID DISEASE IN SLAUGHTERED ANIMALS IN KASHMIR VALLEY

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The prevalence of hydatid disease was investigated in 200 sheep, 76 goats, 57 cattle and 25 buffaloes slaughtered at different abattoirs in Kashmir valley between August 2001 to July 2002. The overall percentage infection rate of hydatid disease was 26.00, 14.47, 38.59 and 8.00 in sheep, goats, cattle and buffaloes respectively. Lungs and liver were the common sites for hydatid cysts, but spleen, kidney and heart were also involved in some animals. Fertility of hydatid cyst was highest in sheep (98.38%), followed by buffaloes (50%), goats (27.27%) and the least was in cattle (9.09%). Due to high fertility rate of hydatid cysts in sheep, they were considered to be the best disseminators of hydatid disease in Kashmir valley.

COMPARATIVE DIAGNOSTIC EFFICACY OF INDIRECT ELISA AND DOT-ELISA FOR EARLY DIAGNOSIS OF F.GIGANTICA INFECTION IN CATTLE

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Fasciolosis caused by Fasciola hepatica and F.gigantica is a worldwide problem in livestock. In the Indian subcontinent, F.gigantica is most prevalent and responsible for heavy mortality and morbidity in livestock. Since coprological examination fails to detect infection at early stage it has become mandatory to detect infection by other suitable methods. Immunodiagnostic methods have been found to be suitable alternative supplements to conventional parasitological techniques for the diagnosis of prepatent F. gigantica infection in ruminants. With an aim to develop suitable tests for early detection of F. gigantica infection, the diagnostic efficacy of two immunoenzymatic techniques (ELISA and Dot-ELISA) was compared using a purified antigen. The functional antigen of the parasite was identified by western blotting and later isolated by two steps affinity chromatography. Diagnostic efficacy of the isolated antigen was tested in both ELISA and Dot-ELISA formats. Both the tests could detect infection in experimentally infected animals as early as 2nd week post infection. However, detection of infection is very fast in dot ELISA (3hr 10 min) in comparison to indirect ELISA where about 9 hr besides overnight incubation of plates at 4°C for proper coating of antigen is required. Moreover, the results of Dot-ELISA can be interpreted by visual observation while costly ELISA reader is a must to read the optical densities of test samples at a specific wavelength. The potentiality of Dot-ELISA for large scale screening of F.gigantica infection in cattle is discussed.
P5.1

VACCINATION AGAINST HAEMONCHUS CONTORTUS INFECTION IN BARBARI GOATS WITH LOW MOLECULAR PROTEINS AND CRUDE SOMATIC ANTIGENS


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The immune responses of crude somatic antigen (CSA) and low molecular weight protein antigen (LMWAg) were observed in twelve Barbari goats of 6-9 months age. The antigens were administered in goats divided in three groups A, B and C containing 4 animals each. While Group A and B were vaccinated with LMWAg and CSA respectively at 0 and 14 days and 21 day of experiment, the group C remained as unvaccinated. All the three groups were challenged with 2000 1. Haemonchus contortus larvae on 24 days of experiment.

The observations were recorded on prepatent period, faecal egg count, abomasal worm count with their length and weight, haematological parameters like total erythrocyte count (TEC), Differential leukocytes count, hemoglobin, biochemical profile of enzymes, proteins and serological response. The observations revealed significant increase in prepatent period of worm with simultaneous decrease in faecal egg count, worm count, mean worm length and weight in vaccinated groups. TEC DLC, PCV, haemoglobin assay revealed significant difference among different groups. So also, the variations in biochemicals like enzymes and proteins (albumin and globulin) were significant.

P5.2

POSSIBLE RISK FACTORS FOR THE SPREAD OF HYDATID DISEASE IN KASHMIR VALLEY

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The present study was done in order to know the risk factors for the spread of hydatid disease in Kashmir valley. For this purpose, different study sites were selected which were numbered as Site I - where there were well protected slaughter houses, Site II - where there were open slaughtering. Site III - near meat shops where the butcher give raw offal to dogs, Site IV - Highland pastures where livestock's were guarded by dogs Site V - near the fields where dead animals were thrown open and Site VI - Areas where there were no source of getting infection i.e. around household. In each study site, 10 dogs were screened by purging with arecoline hydrobromide in order to know the incidence of Echinococcus in dogs. The overall percentage rate of Echinococcosis was 10.00, 80.00, 70.00, 20.00, 60.00 and 0.00 in study sites I, II, III, IV, V and VI respectively. It was concluded that open slaughtering, giving raw offal to dogs by butchers and throwing of infected dead animals in open fields were the main risk factors for the spread of hydatid disease in Kashmir valley.
Souvenir And Abstracts
National Seminar on
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September 29-October 1, 2003

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like heavy leukocytic infiltration and fibrosis at various distances from the cyst wall with the findings that the damage was inversely proportional to the distance from the cyst. Near the wall of larger cysts, cytoplasmic and nuclear vacuolation in hepatocytes were also seen. Some of the larger cysts also showed pressure atrophy due to which hepatic architecture was completely destroyed.

Key Words: Histopathology; Sheep; Liver; Hydatidosis

HAEMATOLOGICAL PROFILE IN CARP HELMINTHIASIS

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Abstract: The helminth infection in *Cyprinus carpio*, causing disturbances in the haematological parameters with respect to Hb contents, PCV, ESR, TEC, TLC, DLC and haematometric indices MCV, MCH and MCHC, was studied. The fish were infected with helminths. Blood was collected from fish, in glass vials containing EDTA as anticoagulant, after which the fish was dissected for possible helminthic infection. The helminths collected, belonged to genus *Adenoscoleex*, *Othienocephalus* and *Ponphorhynchus*. The Hb value, measured by Sahli's method was found decreased in infected fish as compared to uninfected ones (normal men 9.8g%) falling as low as 6g% in heavy infection. An increase in ESR from a normal mean value of 1.6 mm 1st hr reading to 3.3 mm 1st hr reading and decrease in PCV from a normal mean value of 33% to 24% in acute infection was recorded. Both these parameters were calculated using Wintrobe tubes. TEC decreased from a normal mean value of 2.2x10⁵/mm³ to 1.5x10⁶/mm³ whereas TLC increased from a normal mean value of 2.4x10⁴/mm³ to 62x10⁴/mm³ in heavy infection. Neuber's Chamber (West Germany) was employed for TLC & TEC. DLC showed significant increase in neutrophil and eosinophil numbers.
of parasites are exploiting the antiparasitic response mechanisms of the host to optimize host-finding, invasion and survival in the host. Such interactions between host and parasites are phylogenetically old. These dynamic interactions between host and invaders have been observed in various branches of fish parasitology. Experiments with ectoparasites indicate that the parasites are activated by factors in host mucous (first line defence). Some monogeneans, cestodes, digeneans, acanthocephalans and crustaceans are able to resist pronounced cellular host reactions which even will improve the attachment of parasite to host tissue. Despite these evading mechanisms in the parasites, it is possible to use immunoprophylactic measures to control infections. Some parasites are indeed actively rejected by their potential hosts provided these are effectively immunized at certain early points before infection.

Key Words: Parasite, Immunity, Fish, Immunization

HISTOPATHOLOGY OF SHEEP LIVER NATURALLY INFECTED WITH HYDATID CYSTS

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Abstract: Hydatid cysts with surrounding liver tissues were isolated from sheep and transformed into fixative solution (10% formaline). Histological sections of the liver were prepared and stained with haematoxylin and eosin. Intensity of histopathological changes were found proportional to the size of the cyst. Small hydatid cysts (5mm - 1cm diameter) showed pathological changes only close to the cyst wall. The hepatocytes were deformed due to reduced cytoplasmic contents and large gaps were seen around the fibrous cyst wall. Large hydatid cysts (10-15cm diameter) showed prominent changes.
3rd GLOBAL MEET ON PARASITIC DISEASES
January 12 - 16, 2004
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The screen of samples revealed great faunal diversity and the total species found belonged to 38 genera representing all possible Orders except Chromadorida. Of the three trophic groups of nematodes, the detritivores formed the dominant lot representing species from 17 genera. The predators (carnivores) and plant parasitic (herbivores) represented 11 and 9 genera respectively. The juvenile stages of potential pest nematodes, cyst nematodes and the root knot nematodes were not found indicating their absence. However, the most frequent and abundant phytoparasitic was the spiral nematode Helicotylenchus. The predator, Dorylaimus sp. was found to be the most frequent and abundant species in all the samples. The next dominant and frequent species belonged to bacteriophagous and saprophagous genera viz., Mesorhabditis, Acrobeles, Cephalobus and Panagrolaimus. Predators with larger body dimensions contributed the most to the nematode biomass. The maximum biomass recorded for Dorylaimus sp. was 30 ig. The studies of the selected area of the park indicate towards a balanced trophic community of nematodes with population of plant parasites brought well under control. The abundance of saprophagous forms further is a sign of productive soil rich in organic matter.

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The Occurrence And Pathogenicity Of Gizzard Nematode, Amidostomum anseris (Amidostomatidae) In The Whooper Swan, Cygnus cygnus Of Kashmir

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In a parasitological study, 24 domestic whooper swans (Cygnus cygnus) were collected from February 2003 to October 2003 from 9 locations and were examined for endoparasites. During the study, it was found that 15 adults comprising of 8 cobs and 7 pens were found uninfected. On the contrary out of 9 immature Cygnets, 2 (8.33 %) were infected with gizzard worms. Thus these infected Cygnets were studied. With our special focus of study on the gizzard worms, these nematodes have been identified as Amidostomum anseris. A total of 41 of these thin bright red gizzard worms (consisting of 12 males and 29 females) were collected from the infected gizzard and a single nematode (Amidostomum anseris) was also recovered from intestine while examining single Cygnet. The other Cygnet was infected with 3 gizzard worms (consisting of 2 males and 1 female). A cumulative frequency curve has been drawn between host age and the incidence of infection. The histopathological examination of the infected gizzard reveals ulceration of the horny cornification lining of the gizzard. The grinding pads show degeneration of its edges. The gizzard lining is sloughed off, inflamed and show haemorrhagic stomach lesion. As a result of gizzard worms, there is denudation of the surface lining of the gizzard. The lining of the gizzard appears black in areas adjacent to the site of the worms.

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Incidence, Fertility And Viability Of Ovine Cystic Hydatidosis In Kashmir Valley

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The incidence of cystic hydatidosis was investigated in 405 sheep of different ages slaughtered at different abattoirs in Kashmir valley between August 2001 to July 2003. Out of 405 sheep, 103 animals were infected with hydatid cysts revealing an overall infection rate as 25.4%. The sex ratio of the infected sheep was 1:1. The ratio of the numbers of animals as sex varied: males were as female and most of the older animals were female. Older animals were more often
infected with hydatid cysts than young animals, prevalence increased from 9.5% in lambs aged = 1 to 40.0% in ewes aged = 5 years. The organ-wise distribution of hydatid cysts showed that liver was found to be more frequently involved (55.33%) than lungs (20.38%). Of 78 cysts examined, 55.3% were fertile. The distribution of fertile and viable cysts by age and cyst location was evaluated. Although viable protoscoleces were found in 82.3% of fertile cysts, the mean percentage of viable protoscoleces was highest in 2-year-old animals and decreased slightly with increasing age.

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Fish Trematode Parasites Of Kashmir, Part III- Genus Allocreadium Looss, 1900 (Digenea)

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Fishes, like all other living organisms can in certain circumstances become subject to disease and to properly deal with the disease it is necessary to know about the illnesses likely to be contracted and their cure. It is not difficult to keep fishes in good health because fishes have a very great resistance to disease so long as they are not weakened by bad treatment, unsuitable food, lack of oxygen, too high or low temperature, parasitism or other adverse influences. Thus parasitism forms an important factor which influences the fishes health. It is in this context that a thorough helminthological study of the fishes of two freshwater lakes- Manasbal and Anchar, was carried out. In addition to monogenetic- Diplozoon and larval digenetic- Clinostomum parasites, six species of the digenetic trematode genus- Allocreadium, were found infecting the fishes of these waterbodies. The six species of the genus Allocreadium, as described in the present paper, in addition to the type species of the genus A. isoporum (Looss, 1894) Odhner, 1901 include A. singi Rai, 1962; A. transversale (Rudolphi, 1802) Odhner, 1901; A. foederari Dhar and Khare, 1984; A. schuurhorstii Pande, 1938 and A. nemachitus Kaw, 1950. While all the species have been recorded from the intestine of Schizothorax niger from Manasbal lake the last species in addition to its above host and locality has also been recorded from the intestine of S. carassius from Anchar lake. While the first three species are recorded here for the first time from this region, the last three species have been recorded from new localities. Comparative tables have been given for all the six-recorded species to bring out the intra-specific variations. In addition a table listing 23 Allocreadium species from Indian fish species has been given.

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Cestocidal Activity Of Psidium guajava Against Experimentally-Induced Hymenolepis diminuta Infections In Rats

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The cestocidal activity of methanolic extract of leaves of Psidium guajava, was tested using experimentally-induced Hymenolepis diminuta infections in Swiss albino rats. H. diminuta infections were established by inoculating known numbers of cysticercoids to each rat. Animals were divided into six groups. Group 1 served as control, group 2,3,4 and 5 were given varying doses of the methanolic extract of P. guajava. The last group was administered with a reference drug, Praziquantel for the comparison of plant's efficacy. Following treatment the anthelmintic efficacy of plant extract was monitored by counting the eggs per gram (EPG) of feces and also by recovery of adult worms at necropsy.

A significant reduction in the EPG count was observed in all the four groups of plant extract treated rats as compared to the control. The efficacy was found to be dose dependent with regard to the worm load at necropsy. The same decrease by 25%, and 75%, with the lowest and highest
doses of plant extract, respectively. The efficacy with regard to Praziquantel at its 5 mg/kg dose was recorded to be 91.66%. No visible signs of any adverse effects were noticed in the rats treated with different doses of plant extracts. The study indicates towards presence of cestocidal efficacy in the leaves of *Psidium guajava*.

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**Rate Of Infection And Of Reinfection With Echinococcus granulosus In Stray Dogs Of District Anantnag Of Kashmir Valley**

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Hydatid disease constitutes a serious public health and economic problem in Kashmir valley. In the present work it was intended to evaluate the prevalence of the canine echinococcosis in stray dogs of district Anantnag of Kashmir province and the reinfection rate after strong educational campaign during the period August 2001 to July 2003. A total of 188 stray dogs were tested by purging with Arecoline hydrobromide (sigma) in 4-area (2 urban and 2 rural) in order to establish the initial prevalence rate which was 44.68%. The incidence of infection was more in rural areas (60.00%) than urban areas (17.64%). From August 2001 onwards the education programmes to general public and persons responsible for offal disposal and animal carcasses was launched. Emphasis was placed on the need to prevent dogs gaining access to raw offal i.e., to break the transmission. To determine the reinfection rates, 180 dogs were studied again in the 4-study areas of district Anantnag between April 2003 to July 2003. The overall rate of infection decreased from 44.6% in August 2001 to 31.6% in July 2003, and infection rates decreased significantly in urban areas (17.6% in 2001 to 5.3% in 2003) than rural areas (60.0% in 2001 to 52.6% in 2003).

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**Prevalence Of Gastro-Intestinal Nematode Parasites In Sheep Of Kashmir Valley**

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Guts of 61 sheep examined for nematode parasites were collected from local abattoirs of valley during the period January 2003 - October 2003. Of these, 29, 47.5% were found infected with nematodes. The nematode species recorded during present survey were Haemonchus contortus, *Marshalaqia marshalli*, *Bunostomum trigonocephalum* and *Trichuris ovum*. Most of sheep examined were found to be parasitized by more than one species of nematode. *Trichuris ovum* emerged as the most prevalent nematode parasite, although *Haemonchus contortus, Marshalaqia marshalli* and *Bunostomum trigonocephalum* were also significantly in evidence. Worm burden were higher in young sheep as compared to older ones. The burden of nematodes was found heavier in the month of July and August. The multiple infections of various different nematodes were observed in the month of October.

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**Mosquitocidal Effects Of Vitex negundo On Malarial Vector, Anopheles stephensi Liston**

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Laboratory and field investigation have been made to evaluate the effect of different solvent