

## AN APPRAISAL OF TRAINING IN VETERINARY PARASITOLOGY IN TEACHING INSTITUTIONS OF PAKISTAN: CONTRASTS WITH GLOBAL APPROACHES IN VETERINARY EDUCATION

A. Jabbar, Z. Iqbal, G. Muhammad<sup>1</sup> and Zia-ud-Din Sindhu

*Department of Veterinary Parasitology, <sup>1</sup>Department of Veterinary Clinical Medicine and Surgery, University of Agriculture, Faisalabad-38040, Pakistan*

### ABSTRACT

This paper describes the advantages and disadvantages of various approaches of teaching veterinary parasitology, including the disciplinary, the problem-oriented and combined approaches. In the disciplinary approach, parasitology is taught in the classical manner as a coherent subject, covering parasite morphology, biology, molecular biology, epidemiology, pathology and immunology, as well as clinical manifestations, diagnosis, therapy, control and prevention of parasitic diseases. Problem-oriented teaching approaches the subject, starting from diseases in animal species or from organ systems or other objectives (e.g. food safety); it also tackles training of skills for problem solving and self-learning. Combined approaches include elements of the disciplinary approach and those of other methods. As an example, a new curriculum (as a combination of organ-focused and problem-based approach) of the Faculty of Veterinary Medicine, University of Berne, Switzerland, has been discussed. Based on the observations and experiences regarding teaching veterinary parasitology, some suggestions have been made which may be helpful in the development of curriculum of veterinary parasitology in Pakistan.

**Key words:** Teaching methods, veterinary parasitology, curriculum, Pakistan.

### INTRODUCTION

During the past few decades, the veterinary profession has been exposed to numerous new developments in science, agriculture, animal husbandry, disease control, public health and other relevant fields. Veterinary education has to respond to new challenges, particularly in the developing countries like Pakistan, where a tangible drift has been recorded in the national economy from crop to livestock sector. This is a consequence of shortage of water available for irrigation, a rapid increase in the small land holdings, soil degradation etc. Currently, there is a broad agreement that (a) future veterinary education should produce competent graduates, who are able to act both professionally and effectively, and flexible enough to respond to changes in the veterinary profession (Blackwell, 1993); (b) all students should graduate from their courses with the same general certificate that will be a qualification to practice in all fields of veterinary science; and (c) veterinary specialization should occur after the primary qualification has been obtained (Pirie, 1993). This means that future undergraduate education in veterinary medicine has to provide the basis for obtaining a universal certificate which confers the right to practice, as in the past, but should offer more

flexibility and improved options for postgraduate specialization and continuing education (Eckert, 2000). Therefore, the teaching subjects and methods have to be reconsidered and more emphasis has to be laid on flexibility, understanding and solving problems, and on self-learning of students in order to impart skills to cope with new challenges in their professional lives. Keeping in view these challenges, many veterinary institutions around the world are restructuring their undergraduate teaching programmes, and some have modified the curriculum using or evaluating various teaching approaches, including new methods, such as computer and internet-assisted learning. In some faculties, there is a tendency to reduce the contact hours in undergraduate teaching of veterinary parasitology to rather low levels and to divide teaching in this discipline into selected components within the framework of problem-based, interdisciplinary teaching activities, with focus on organ systems, animal species or other subjects (Anonymous, 2002).

In this paper, various approaches used to teach veterinary parasitology have been discussed. Furthermore, information on a pilot curriculum of veterinary education as a paradigm, which was introduced at the Faculty of Veterinary Medicine, University of Berne (Switzerland) has also been

presented. This can be used as a guideline/model for the development of revised parasitology curriculum in Pakistan. The aim of this publication is to stimulate discussions on teaching approaches and methodologies for veterinary parasitology and to provide comparative information of the current situation in various parts of the world. This information would be helpful to give considerable advice in the complicated process of changing and improving curricula for education in veterinary parasitology.

## TEACHING APPROACHES

There are several choices of teaching veterinary medicine and parasitology which have been discussed in detail earlier (Eckert, 2000). These include the disciplinary approach, problem-oriented approaches focused on diseases of animal species, organ systems or other subjects, and combined approaches thereof.

### Disciplinary approach

In this method, parasitology is conventionally taught as a coherent subject, covering parasite morphology, biology, molecular biology, epidemiology, pathology and immunology, together with clinical manifestations, diagnosis, therapy, control and prevention of parasitic diseases (Soulsby, 1994; Euzéby, 1996). Using parasite taxonomy as a primary pattern, the disciplinary approach provides an effective and easy access for the students to gain an overview on parasitology and parasitic diseases and, most importantly, to understand the complex networks of epidemiological key factors, the parasite-host relationships and their clinical significance, the zoonotic potential of parasites etc. In this regard, it has to be emphasized that many of the parasitic infections involve several host species and several organ systems or in most cases the whole host organism.

Experience gained during the last two decades has shown that the disciplinary approach can provide an adequate basis of knowledge and skills of veterinary parasitology for professional life if it is well structured, concise, focused to relevant parasitic diseases and well balanced regarding the depth and breadth of knowledge. This approach has certain disadvantages like insufficient integration between parasitology and other disciplines, overlapping between disciplines, and the lack of training of the students for self-directed learning and for applying their knowledge to practical problems.

### Problem-oriented approaches

Curricula based on problem-oriented teaching were first introduced in medical schools, e.g. at Harvard Medical School in 1985 and at Bowman Gray School of

Medicine (USA) in 1987/1988 (Philip and Camp, 1990). At the latter school, 25 students were accommodated per year, six to eight students per group, each with a basic scientist and clinician as a supervisor. The students had confronted with clinical cases and patients already in the first year. The main objectives of the curriculum included training of independent learning, critical thinking, learning of problem solving skills, enhancement of understanding of disease mechanisms, training of team-work and life-long learning habits. Several veterinary schools or faculties have also introduced curricula using problem-based teaching, e.g. Cornell University, Ithaca, USA in 1983 and the Faculty of Veterinary Medicine, University of Utrecht, The Netherlands in 1995 (Eysker, 2002). Such curricula have been focused on diseases affecting various animal species, on organ-oriented diseases or both. For many years, schools in Europe practiced some elements of problem-oriented teaching, especially in the clinical part of the curriculum, with relatively small groups of students having access to clinical patients under supervision of academic staff members. Similarly, in Pakistan, one credit hour course for parasitology clinic has been started in revised curriculum in 1998. Undoubtedly, problem-oriented teaching of small groups of students has certain advantages, but this system encounters difficulties in many schools because of too large number of students, lack of staff and appropriate teaching infrastructures, and a limited number of patients. It is, therefore, mostly taught in the laboratories, thus defeating the purpose of problem-oriented teaching approach.

### Combined approaches

Another choice of teaching veterinary parasitology is a combined disciplinary and problem-oriented approach (Eckert, 2000). In this approach, various disciplines should initially present concise overviews on parasitic and other infectious diseases, including all aspects from etiology to control. Enough time has to be reserved for practical training and self-learning of the students, who should have access to computer-based and interactive learning facilities. General principles of infectiology and diagnostic techniques can be taught in an interdisciplinary approach together with bacteriology, virology and pathology. In this period, some modest options for specialization may be offered as electives, e.g. tropical parasitology or parasitic diseases of wild and zoo animals. In the clinical part of the curriculum, cases of infectious diseases should be presented in a problem-oriented approach predominantly focused on animal species and subjects relevant to the veterinary profession (e.g. food safety). Ideally, these

presentations should be interdisciplinary endeavors with participation of clinicians, infectiologists, pathologists and other specialists.

### Region-specific approaches

There are certain parasitic diseases of animals which are specific for a particular area e.g. fascioliasis is a pertinent parasitic disease of marshy areas. Similarly, the diagnosis and control practices used by the local farmers are also equally important and helpful in field conditions. The knowledge on these area-specific parasites and control measures should be gathered and be included after scientific validation. This approach will help the students to easily tackle with region-specific parasitic problems.

### Example of a new curriculum as a model

A new curriculum of the combined type was established in 1999 at the Faculty of Veterinary Medicine, University of Berne, Switzerland (Gottstein and Eckert, 2002). The curriculum comprised 5 years of studies. Organ-focused teaching covered three days a week for the second and third year of the curriculum. Simultaneously, organ-independent teaching was comprised of two half-days a week for two years. For all teaching modes, approximately 50% of the time was used for lectures, 30% for practical training and/or tutorial groups and 20% for self-education. Years 4 and 5 were devoted either to problem-oriented clinical and paraclinical education or enhancing of experiences in clinics and institutes of paraclinical disciplines. In this way, practical training, including mainly parasite morphology and diagnostic exercises, are directly integrated into the corresponding disease block, so that lecturing and practical works (mainly microscopy) are combined as more attractive features for the students. Additionally, one day per week was also used for "elective" in-depth studies of animal species-specific aspects (students had to select a specific track already after the first year in fields of small animal medicine, equine medicine, production animal medicine, paraclinical sciences or veterinary public health).

Consequently, the short-term experiences with a combined approach of teaching veterinary parasitology at the University of Berne, Switzerland have basically confirmed some advantages of problem-oriented and organ-focused teaching in certain domains, but have clearly shown the need to maintain the basic integrity of other fields such as infectious diseases. Nevertheless, closer interdisciplinary contact and collaboration, especially in elective teaching, was enforced between paraclinical and clinical teaching by reforming the curriculum. Operationally, however, it turned out that large student numbers (organ-focused teaching includes

two student classes in parallel) in relation to the resources of manpower, rooms and finances limited the workability of the curriculum.

## DISCUSSION

Generally, the taxonomic approach of presenting parasitoses has been replaced by an order following the organ-focused teaching as far as possible. This means, e.g. that intestinal parasitoses are taught at the same time as the digestive tract is taught as an organ-block. Parasitoses themselves are taught conventionally including parasite morphology, biology, epidemiology, pathogenesis/pathology and immunology, along with clinical manifestations, diagnosis, therapy, control and prevention of parasitic diseases. Therefore, teaching incorporates an additional participation of veterinary parasitology in this elective learning, allowing, e.g. to present in more details the problems and the differential diagnosis of gastrointestinal nematodes in ruminants. This teaching is commonly organized together with clinicians and/or pathologists per elective field.

The present curriculum of veterinary parasitology at various universities in Pakistan offering Doctor of Veterinary Medicine (DVM) degree partially represents disciplinary approach. Two textbooks (Soulsby, 1982; Urquhart *et al.*, 2000) are the main source of available teaching material for the students of veterinary parasitology. Broadly speaking, these books have also been written on the pattern of disciplinary approach. Despite vigorous efforts, it has been observed that the retention level of the students is not satisfactory. The reasons advanced by the students for lower level of retention include the taxonomic details of the parasites, poor teaching aids, lack of practical demonstration of parasites/parasitic diseases and un-necessary teaching of curriculum having no/little practical significance. Students are of the view that they should be taught about classification of parasites in one or two classes at the most, followed by lectures on different diseases caused by parasites detailing about their etiology, pathogenesis, treatment and control complemented by practical post-mortem demonstrations (personal communication).

In Pakistan, the curriculum of DVM remained unchanged for 20 years (1978 to 1998) and from 1998 onward, the curriculum has been revised three times but the contents are almost the same except a few changes in practical courses. There are three main courses of parasitology which are being taught at undergraduate level viz., General Parasitology and Protozoology, Helminthology and Veterinary Entomology. One of the important aspects of diseases of animals is parasitic

zoonosis but this area has been neglected in the curriculum of DVM.

Recently, Pakistan Veterinary Medical Council and Higher Education Commission have revised DVM curriculum. Moreover, an Inter-University Faculty Board (IUFB) has been constituted by the Governor of Punjab in his capacity as Chancellor of all the universities of Punjab. The approach for teaching parasitology has been the orthodox one i.e., disciplinary approach. But this approach has been changed with problem-oriented or combined (disciplinary and problem-oriented) approaches throughout the world. Keeping in view this situation, it is the dire need of the time that a solitary body/institute should be given the mandate for curriculum development in general and the conventional method of parasitology teaching i.e., disciplinary should be combined with problem-oriented teaching in particular at the proportion of 50:50. The revision should be made in the light of guiding principles of World Association for the Advancement of Veterinary Parasitology (Anonymous, 2002).

Teaching methodology for veterinary parasitology in Pakistan is also an outdated one. Conventional methods are being used to teach theory and practical classes. For example, use of slides for practical training, is an outdated method, and should be replaced with audio-visual demonstrations, information technology and practical training on live or slaughtered animals. We should find a way to teach all of parasitology in less time with the help of technology. This includes web sites, CD ROMs and programmes that facilitate programmed learning. Several universities in developed countries have made some of their course materials available electronically on the web for use by their students, as well as students at other institutions. Among the first to be introduced was a site developed by Dr. Robert Corwin (recently deceased) at the University of Missouri (USA) for his veterinary parasitology course available at <http://www.parasitology.org> and Dr. Colin Johnstone at the University of Pennsylvania (USA) available at <http://cal.nbc.upenn.edu/merial/> for the Penn students. The information at these sites has continuously been revised and additional faculty/institutions have developed parasitology web sites (Stromberg, 2002).

Because parasitology is such a visual discipline, we can take advantage of the many images we have acquired and share them with our students and colleagues in the electronic format. There are many web sites available that have numerous images of parasites. With the teaching time considerably slashed, one can make use of electronic material to get around this problem. At the University of Minnesota (USA), each student is provided with a CD ROM that includes all of the lecture notes, copies of all the PowerPoint

presentations used for lecture, laboratory exercises and a study set of 13 presentations and questions. In Pakistan, we can make use of the Virtual University, which has been established for distant learning, by developing websites of different fields of veterinary science. Furthermore, each veterinary parasitology department at every DVM degree awarding institute should develop its own website, so that the students would have an easy and quick access to teaching material.

Owing to the era of specialization in every field, some fields of specialization at undergraduate and post-graduate levels may be offered in the curriculum of veterinary parasitology. For example, wild life parasitology and public health parasitology can be offered as electives to the graduates. Additionally, specialization in the parasites of dairy animals, pets and small ruminants can also be offered.

It can be assessed that a continuous modification and improvement of the curriculum is still necessary. In plans for a modified curriculum, new statutory regulations in Switzerland and experiences from other countries like Australia, USA and Italy should be considered. A combined approach of teaching veterinary parasitology, including basic disciplinary teaching and additional problem-oriented education, has recently been proposed in a resolution by the World Association for the Advancement of Veterinary Parasitology (Anonymous, 2002).

### Conclusions

Parasitologists of Pakistan should revise the curriculum in the light of global scenario. We should tag along the guidelines of World Association for the Advancement of Veterinary Parasitology which has identified the problem of curriculum revision and has adopted a resolution in which the minimum requirements for the number of contact hours in teaching undergraduate veterinary parasitology are defined. It is suggested that an advisory board comprising academicians, clinicians and other stakeholders should be constituted at least at provincial level with the aim to give recommendations to government for curriculum development on the basis of country problems.

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