

Estimation of Public Health Impact of Rabies in Kadapa District, Andhra Pradesh, India

K. Mounica¹, Veluri Shravani², S. Sai Srinivas³

Students BVSc & AH, College of Veterinary Science, Proddatur, Kadapa District, Andhra Pradesh-516360

Abstract: Rabies is a fatal, preventable zoonosis but it is not effectively controlled throughout much of the developing countries like India. The impetus for control is hampered by a lack of awareness of true impact. We estimate a disability adjusted life year (DALY) score for rabies to quantify the disease impact relative to other diseases to set priorities for public health interventions.

Keywords: Rabies, DALY, Public health

1. Introduction

Rabies is a fatal disease that is considered a re-emerging zoonosis throughout much of the world (Rupprecht CE, Taylor HL, Lathan SM). Rabies satisfies all the World Health Organization (W.H.O) criteria for diseases that are priority for control (WHO Strategies, 2002) and, unlike many other emerging zoonoses, (such as dengue and West Nile virus), safe and effective animal and human vaccines are widely available for its prevention and control. Despite this, rabies remains a neglected disease that is poorly controlled throughout much of the developing countries, particularly Africa and Asia. Where most human rabies deaths occur (WHO Strategies, 2002, Rutebarila C, 2000). A major factor in the failure of rabies control is the low level of political commitment, partly arising from a lack of quantitative data on the true public health impact of disease (WHO STRATEGIES, 2002) and the cost effectiveness and cost benefits of controlling it (Bogel K, 1990).

The disability-adjusted life year (DALY) is standardized, comparative measure of disease impact developed to assess the relative impact of different diseases across different settings and at different stages of economic and public health development (Murray CJL, 1996). The DALY is a combination of the years of life lost (YLL) due to premature death and the years of life lived with a disability (YLD). DALYs have been used to organise disease control in health sector (WHO Investing in health research and development, 1996) because interventions can be prioritized on the basis of their impact in reducing disease and on the cost effectiveness of the intervention. Most emerging human diseases are zoonotic (Taylor HL, Latham SM, 2001); while DALYs have been estimated for some of these, such as leishmaniasis and trypanosomiasis, a DALY score has never been determined for rabies, which has failed to be considered in any the annual global disease burden estimates made by W.H.O (WHO Health report, 2002).

2. District Estimate

A DALY estimate which can be used to rank diseases globally can also be used to prioritize health interventions at a district level. As a result of widespread problems of data quality and underreporting of rabies, a new approach has recently been adopted in India to estimate human rabies

death by using a decision tree method based on the incidence of human dog bite injuries. Such bites are reported routinely and more reliable than rabies cases themselves (Cleaveland S, 2002) Age-specific human rabies incidence figures calculated from detailed data collected in the Proddatur region (Cleaveland, 2002), Andhra Pradesh were extrapolated to provide a district level rabies DALY estimate of 471 for all Kadapa district in 2017-18(table-1).

Table 1: Estimates of the DALY impact of human rabies in Proddatur, Kadapa district, Andhra Pradesh

Age group (y)	Rabies cases
0-4	123
5-14	198
15-44	84
45-59	42
60+	24
ALL AGES	471

This example demonstrates how a district specific mortality and DALY estimate can be calculated by using quality data collected from a specific study site. Indeed the same method used to estimate the annual number of human rabies cases (Cleaveland S, 2002) and thus DALY impact in kadapa district may be applied across India to estimate the regional level of underreporting relative to officially reported figures. However, care needs to be taken when extrapolating from small scale studies to regional and national levels for example in India country level estimates of human rabies deaths are likely to be effected by regional variations in rabies incidence in different dog populations (which are the main source of human rabies exposure), availability of post exposure treatment and levels of knowledge about rabies which will affect the probability of seeking treatment in hospitals. In addition, knowing the scale of DALYs lost due to single disease in isolation is not helpful to decision makers prioritizing interventions with limited funds. Better country level estimates for other disease also need to be determined however this study is a first step.

3. Global Estimate

We calculated the global DALY for rabies of annual WHO estimates of 35000 deaths (WHO World Survey, 1998) and using a standard method (Murray CJL, 1996) to allow comparison with the most recent estimates (WHO Health report, 2002) for the diseases identified for the united

nations development programme/world bank/WHO special program for research and training in tropical diseases known as TDR (Remme JHF, 2002). The figure of 35000 deaths per year may be expressed in terms of DALYs if certain assumptions about the age and sex distribution of rabies patients are made. Data on age related exposure to rabies were obtained from Eng et al. (Eng TR, Fishbein DB, 1993), a detailed study of human rabies in Mexico. Analysis of dog bite injuries showed a ratio of male: female cases of 0.53:0.47. The age distribution of persons bitten was skewed towards younger ages a common pattern seen across developing country settings, 60% of cases occurred in the 0 to12 year range, 10% in the 13-19 year range and 30% in the >20 age range.

When these age and sex distributions of patients are used, an annual impact of 35000 human rabies deaths equates to approximately 1.16million DALYs. This estimated DALY impact is conservative because it considered only the YLL component and does not takes into account YLDS resulting from the illness associated with trauma of animal bites and post exposure therapy, if available.

Total of 1.16 million DALYs places rabies just behind trachoma slightly above onchocerciasis and well above dengue (table 2). This estimate shows rabies to be an important disease in terms of DALYs if the WHO figures reflect the true public health situation. However unlike other zoonosis in the DALY ranking system, Human rabies is fully preventable by disease control aimed at the animal reservoir. All 1.16 million DALYs could in theory be averted through veterinary interventions.

Table 2: The global DALY Score for rabies and other selected diseases

Diseases	Total Daly Lost (×1000)
Malaria	42280
Tuberculosis	36040
Lymphatic filariasis	5644
Leishmaniasis	2357
Schistosomiasis	1760
Trypanosomiasis	1598
RABIES	1160
Onchocercariasis	987
Chagas	649
Dengue	653
Leprosy	177

Although the above DALY figure gives useful indication of the DALY for rabies, the true global incidence of human rabies is difficult to assess because rabies is often in consistently reported. For example the 1996 World survey of Rabies (WHO World Survey, 1998, 1993) recorded a total of 33,212 rabies death worldwide (of which 30,000 were reported in India), while only 1,326 reported in 1991 (when India reported only 34) (WHO World Survey, 1993). Although rabies is known to be grossly under reported in most developing countries, the degree of under reporting is difficult to assess. However, a recent studies from India indicated death human rabies deaths may be up to 100 times higher than officially reported (Cleaveland S, 2002), with an estimated incidence of human rabies similar to that record during active surveillance studies (Kitala PM, 2000). More country level estimates of under reporting using method

similar to that developed for India (Cleaveland S, 2002), need to be conducted to provide more reliable figures of the true global scale of human rabies. However even if 35000 estimates human rabies cases were more than the double the global figure, the DALY impact attributable to rabies would still be comparable to that of dengue fever, which is recognised by TDR as the major public health threat throughout the tropics.

4. Conclusions

The value of providing a quantitative estimate of disease impact due to rabies, even with the in accuracies of existing case data, should not be underestimated. Rabies is often perceived as a rare or insignificant disease of humans in developing countries this perception has been a major factor hamper in the development of disease control initiatives. Further more control of rabies is often seen as a responsibility of veterinary authorities but demonstration of the public health importance of rabies and the benefits of disease control to the public health authorities will encourage involvement of health sector in control efforts. Integration of medical and veterinary sectors is likely to be crucial for effective disease control as shown by the success of recent rabies control programs in central and South America where medical authorities have taken a lead role in implementing mass dog vaccination programs (Pan American Health Organization, 1995).

This first estimation of a global DALY score for rabies, together with Poddatur, Kadapa distctric, AP specific example indicates that the disease exerts a considerable public health impact exceeding other prominent diseases that currently achieve a higher priority for disease control. Furthermore the human disease effects of rabies could be eliminated through vaccination of animal reservoirs by using technologies and methods that are available and accessible.

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