Studies on antimicrobial activity of *Perionyx excavatus* extract against responsible pathogen (Group A β-haemolytic streptococcus) for Rheumatic fever in perspective of Bangladesh

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**Introduction**

The epidemiological association between group A β-haemolytic streptococcal infections and the subsequent development of acute rheumatic fever (ARF) has been well established. Rheumatic fever is still the most common cause of heart disease in children and young adults in developing countries like Bangladesh. The most important sequel of rheumatic fever is pancarditis or rheumatic heart disease (RHD) and about 40-80% of all RF patients develop this diseases condition, which results in significant morbidity and mortality. About 40% of all the cardiac patients in National Institute of Cardiovascular Diseases (NICVD) belong to RHD and 60-80% of cardiac surgery patients were of RHD origin. Recently in NICVD 80% of the total heart valve operation were of Rheumatic origin (Hussain et al., 2008). In an study observed on the total outpatient clinic of National Center for Control of Rheumatic Fever and Heart Diseases, Sher-e-Banglan Nagaar, Dhaka1207 conveyed that about 81% of the subjects presenting to this center come from urban areas of greater Dhaka (Mostafa, Z, 2012).

**Pathogenesis of Rheumatic fever**

The precise pathogenic mechanism of RF has not been defined. Major histocompatibility antigens, potential tissue-specific antigens, and antibodies developed during and immediately after a streptococcal infection are being investigated as potential risk factors in the pathogenesis of the disease. Researchers have focused that T-Cell lymphocytes play an important role in the pathogenesis of rheumatic carditis (RHD). It has also been postulated that particular M types of group A streptococci have rheumatogenic potential effect. Such serotypes are usually heavily encapsulated, and form large, mucoid colonies that are rich in M-protein. These characteristics enhance the ability of the bacteria to adhere to tissue, as well as their ability to resist phagocytosis in the human host. The epidemiological relationship between group A beta-haemolytic streptococcal infections and the subsequent development of acute rheumatic fever (RF) has been well established. RF is a delayed autoimmune response to Group A streptococcal pharyngitis, and the clinical manifestation of the response and its severity in an individual is determined by host genetic susceptibility, the virulence of the infecting organism, and a conducive environment (Kaplan et al., 2000).

**MATERIALS AND METHODS**

The present investigation deals with particular microorganism causing for Rheumatic Fever (RF) along with other five Gram positive bacteria *Bacillus megaterium, Bacillus cereus, Bacillus subtilis, Staphylococcus aureus*, and *Sarcina lutea*. Earthworm, *Perionyx excavatus* were collected from the Raja Bari dairy farm of Rajshahi and the bacterial strains were collected from the environmental Microbiology laboratory of ICDDR, B for the study. Ethanol, methanol and chloroform were used as solvents for extraction of *P. excavatus* tissue, among them ethanolic extract was the most effective against group A β-haemolytic Streptococcal bacteria. The effectiveness of the vermextracts was compared and evaluated with standard antibiotic disc in the Environmental Microbiology laboratory at Institute of Environmental Science (IES), Rajshahi University.

**Results**

<table>
<thead>
<tr>
<th>Test Organisms (Gram Positive Bacteria)</th>
<th>Diameter of zone of inhibition (in mm)/each disc (= 6mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P. Excavatus extract (EtOH extract)</td>
</tr>
<tr>
<td></td>
<td>Ethanol</td>
</tr>
<tr>
<td><em>Bacillus megaterium</em></td>
<td>15</td>
</tr>
<tr>
<td><em>Bacillus cereus</em></td>
<td>16</td>
</tr>
<tr>
<td><em>Bacillus subtilis</em></td>
<td>14</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>13</td>
</tr>
<tr>
<td><em>Sarcina lutea</em></td>
<td>12</td>
</tr>
<tr>
<td><em>Streptococcus β haemolyticus</em></td>
<td>18</td>
</tr>
</tbody>
</table>

**Objectives**

The antimicrobial activity of vermextracts (*Perionyx excavatus*) to assess against some human pathogenic microorganisms, especially strains of group A β-haemolytic streptococcus for Rheumatic Fever in perspective of Bangladesh.

**Discussion**

The anti-inflammatory activities of total earthworm extract were conform in animal body, in rat effectively and successively and the researcher suggested the Pexcaavus extracts for future consideration as an antibiotic after appropriate doses form (Yegnanarayan et al., 1987). The anti-inflammatory activity of the earthworm extract was also successful to prevent the growth of some pathogenic bacteria (Ismail et al., 1992). In this experiment we evaluated the strong antibiotic efficicency by the concentrated extract from indigenous earthworm species (*P. excavatus*) tissue which showed the similar zone of inhibition against group A β-haemolytic streptococcus bacteria with the standard antibiotic (Ciprofloxacin15 μg/disc).

**Conclusions and recommendation**

Rheumatic fever is a chronic lethal disease. The diseases if not managed properly in time it provokes chronic progressive damage to the heart and its valves after 10-15 years or in latter life. Researchers are working on a vaccine to prevent streptococcus, but until an effective immunization is developed, only some antibiotic are used to control throat infections. It is the issue of thinking that there is no specific treatment of the diseases only some selective antibiotic to control the diseases! The earthworm tissue contains some also essential amino acids and can play an important role on streptococcal antigens, such as protein M which, cross-react with human tissues. So it is expected that the findings of the experiment my be useful to engender new biomedicine for RF and RHD.

**References**


**Table 1 Results of the Anti-bacterial activity test**

In the table 1. the antimicrobial activity test was done against above gram positive bacteria by the 1.00mg concentration of P. excavatus extracts. Among the 3 extracts the most prominent zone of inhibition was measured 18mm diameter in case of ethanol extracts against streptococcus β haemolyticus while the standard antibiotic dose (Ciprofloxacin15μg/disc) showed the inhibition zone of 18mm. In case of *Bacillus cereus* and *Bacillus megaterium* the inhibition zones were 16mm and 15mm respectively while the zone of ciprofloxacin were 18mm and 16mm. Methanol extract inhibit the highest zone 13mm diameter against streptococcus β haemolyticus and