Reproductive tract infections (RTIs) including sexually transmitted infections (STIs) and HIV/AIDS are being increasingly recognized as a serious public health problem. RTIs result in suffering for both men and women, but their consequences are far more devastating and widespread among women. RTIs often go undiagnosed and hence untreated, and it could lead to complications such as infertility, pelvic inflammatory disease, ectopic pregnancy, abortions, cervical cancer and an increased risk of HIV transmission. A number of studies have been initiated to cover the epidemiological, clinical and diagnostic dimensions of RTIs; which include estimation of population based information on prevalence of RTIs, understanding the mechanism of HIV transmission; immunopathogenesis associated with RTIs, their relationship with other disorders such as cervical cancer, development of simple, cost-effective and rapid diagnosis for RTIs, and prevention using barrier methods.

3.1 *Chlamydia trachomatis* Infection: Association with Clinical Manifestations and Immunopathogenesis (*Partly funded by WHO Country Budget*)

Principal Investigator: **Jayanti Mania-Pramanik**

Project Associates: U.M. Donde, Shobha Potdar and Shilpa Kerkar

Duration: 2002-2005

During the year, standardized simple techniques like wet mount and gram staining for screening of common RTIs as well as sensitive and specific tests like PCR for diagnosis of asymptomatic STIs such as *Chlamydia trachomatis* (*Ct*) and human papilloma virus (HPV) have been undertaken. Samples were obtained from subjects attending the Gynecology OPD of the neighboring G.S. Medical College and KEM Hospital. The results indicated that subjects with reproductive complications like infertility and bad obstetric history (BOH) have multiple infections (Fig. 51) and a significant percentage of these cases were asymptomatic.

A high individual variability in relation to manifestations of various infections suggests an influence by host factors. In infertile women, 81 per cent (*n* = 16) expressed interleukin-2 (IL-2) while in the group with bad obstetric history 54 per cent (*n* = 13) expressed both IL-2 and interleukin-10 (IL-10) locally. In women with *Ct* (*n* = 7), Candida (*n* = 4) and Trichomonas (*n* = 2) infections the presence of IL-2 in the cervical samples suggested that there was differential expression of cytokines in different clinical manifestations and infections. Further studies are in progress to investigate these factors along with HLA in an attempt to understand the mechanisms associated with infection and its clinical manifestations.
3. Detection of *Chlamydia trachomatis* in the Introital Specimen of Infertile Women

Principal Investigator: Jyotsna S. Gokral

Project Associates: Pervin K. Meherji, Jayanti Mania-Pramanik, B.N. Mali, Sunita Kale and Shobha Banage

Duration: 2001-2003

*Chlamydia trachomatis* (*Ct*) infection is one of the most prevalent STI affecting the reproductive health of women. Since the infection is asymptomatic, in most women its early detection is often deferred. *Ct* is localized in the endocervical cells of the cervix and therefore a per speculum examination is required for its detection. Clinical infrastructure for internal examination is generally not available in most of the health centres in India, especially in the rural settings. Infected endocervical cells are shed into the vaginal secretions and these cells could be used for detection of *Ct* using introital (entrance of vagina) smears, which is a simple non-invasive patient compliant method. To test this hypothesis, we had enrolled 74 infertile women who attended the Institute’s Infertility Clinic (Annual Report 2001-2002, p.66). Smears were taken from both the endocervix and the introitus. During the reporting year 26 more subjects were enrolled. The prevalence of *Ct* infection amongst this cohort (100 subjects) was 34 per cent. The sensitivity and specificity of detecting *Ct* from the endocervix was 85.3 per cent and 100 per cent, respectively and from the introitus was 82.4 per cent and 100 per cent, respectively, suggesting that either of the samples could be used. Cytologically cervical inflammatory changes were higher in *Ct* positive women (Fig. 52), thereby exposing women with intraepithelial changes in the cervix due to *Ct* infection to a higher risk of dysplasia and HIV seroconversion rates.
conclusion, the results indicate that either introital or endocervical samples could be used for the detection of \( Ct \) by PCR.

![Fig. 52: Cytological changes seen by Pap smears.](image)

### 3.3 Reproductive Tract Infections: Clinical and Microbiological Study in Women (*Partly funded by WHO Country Budget*)

**Principal Investigator:**  Kamal Hazari  


**Duration:** 2002-2006

RTIs especially STIs are incriminated in a wide spectrum of pathology in women. These conditions include vaginitis, cervicitis, endometritis, salpingitis, pelvic inflammatory disease (PID), ectopic pregnancy (EP), infertility and also prematurity, stillbirth, conjunctivitis and pneumonia in the neonates. RTIs are a serious concern in the era of HIV, since even the non ulcerative STIs increase the risk of HIV transmission 3-5 folds. It is the burden of asymptomatic disease that is responsible for the frequent and severe long term morbidity of RTIs in women and in part for the persistence and spread of STIs in the communities.

The study was initiated with the following objectives: (i) to evaluate the relationship between clinical manifestations and microbiological diagnosis of common RTIs (*bacterial vaginosis, candidiasis, trichomoniasis and Chlamydia trachomatis*) in women at low risk for RTIs; and (ii) to evaluate the therapeutic response to clinical and microbiological cure of these RTIs.
Women were enrolled from among those attending the Institute’s Family Welfare Clinics. Women with pregnancy, concurrent systemic diseases or those receiving immunosuppressants, antibiotics were excluded. Detailed clinical history including gynaecological examinations were recorded. Investigations carried out included pH of vaginal discharge, Whiff test (10% KOH), wet vaginal smear, Papanicolaou smear and endocervical smear for DFA for Ct.

Three groups of women were studied: Group 1: women with evidence of RTIs, on clinical examination who were offered treatment at the initial visit; Group 2: women with subclinical evidence of RTIs, who were offered treatment on the basis of laboratory investigations at a subsequent visit; and Group 3: women with no evidence of RTIs by either clinical or laboratory investigations, (control group). Male partners were also treated for chlamydia and trichomonal infections, identified in the women.

A total of 261 women were screened, of whom 208 were enrolled, 41 in Group 1, 61 in Group 2 and 106 in Group 3. Five women discontinued (4 became pregnant, 1 woman was widowed) and 3 were lost to follow-up due to shifting of residence. A total of 122 women have completed the study. The results will be analysed on completion of the study.

3.4 Identification and Characterization of HIV Receptor on Spermatozoa

Principal Investigator: A.H. Bandivdekar
Project Associates: Vijaya Raghavan, Shilpa Velhal and Jacintha Pereira
Duration: 2002-2005

Sexual contact is the major route of HIV transmission. Earlier, the seminal leukocytes were thought to be the sole source of infection, however, recent evidence suggests that the spermatozoa also carry HIV. Infected spermatozoa can transmit HIV into the urogenital cells. Moreover, HIV infected spermatozoa can fertilize oocyte and transmit the virus into the resulting embryo. Using techniques such as PCR, in situ hybridization, in situ PCR and electron microscopy, the presence of HIV has been reported on the membrane and in the cytoplasm of spermatozoa of infected men, as well as on spermatozoa from seronegative donors preincubated with HIV. However, the modality of HIV entry into the spermatozoa is still not known. Since spermatozoa are devoid of conventional CD4 receptors, it is possible that alternate receptors may be present on the spermatozoa. Our attempts have revealed a specific 160 kDa sperm protein that binds to gp-120 or cell-free HIV, (Annual Report 2001-2002, p.67), which is a CD4 independent HIV receptor.
Identification of HIV receptor on spermatozoa

To confirm the 160 kDa protein is different from the 55 kDa CD4 receptor, sperm proteins were pre-incubated with antibodies to CD4 receptor and analysed by Western blot. It was observed that the antibody to CD4 receptor did not block the binding of gp120 to the 160 kDa receptor protein, thus confirming that the 160 kDa sperm protein is not a CD4 receptor protein.

Characterisation of 160 kDa protein

To characterize the 160 kDa protein further, the human sperm protein extract was fractionated using chloroform/methanol, followed by aqueous extraction. Reactivity with gp 120 was observed only with the aqueous phase and not with the organic phase protein of 160 kDa, suggesting this protein is not associated with glycolipids.

Purification of 160 kDa protein

The solubilised protein fraction obtained from human sperm pellets was fractioned using organic solvents and the aqueous phase subjected to ion-exchange chromatography (Mono-Q column). The 160 kDa protein was present in fractions 3 and 4 (Fig. 53) when analyzed by Western blot. Further purification of the 160 kDa receptor is in progress. These studies will help in understanding the mechanisms of HIV transmission and in the development of preventive modalities for its transmission.

**Fig. 53: Ion-exchange chromatography of 1 per cent Triton X 100 treated human sperm extract. The hatched area indicates the active fraction.**

- Column: MonoQ HR 10/10;
- Flow rate: 1ml/min;
- Sensitivity: 0.05 AUFS;
- Elution buffer: 0.01M Tris HCl, pH 7.0;
- Gradient 0-1M NaCl.

**Fraction 1 = 4-28 ml**
**Fraction 2 = 29-35 ml**
**Fraction 3 = 36-41 ml**
**Fraction 4 = 42-46 ml**
**Fraction 5 = 47-66 ml**
3.5 Nisin: The Antimicrobial Peptide for the Control of Fertility and Sexually Transmitted Infections (Funded by Indian Council of Medical Research under Microbicides)

Principal Investigator: K.V.R. Reddy
Project Associates: Clara Aranha, Sadhana Gupta and R. Dinesh
Collaborator: Sujatha Baveja, K.E.M. Hospital
Duration: 2001-2006

Studies have been initiated to develop a safe, effective intravaginal contraceptive compound, with additional protection against STIs/HIV. Nisin, a food preservative and an antimicrobial peptide, was evaluated for its spermicidal and microbicidal activity. Antifertility studies in rabbits were extended using twelve more animals to confirm the preliminary results obtained earlier (Annual Report 2001-2002, p.68-69). A contraceptive dose of Nisin (1 mg/ml) was applied intravaginally just before mating to a group of twelve fertile female rabbits. A complete arrest of sperm motility was observed and none of the females became pregnant; whereas all the six control rabbits conceived. Further studies to evaluate its bioavailability, and toxic effects if any, were undertaken.

Bioavailability of Nisin in the vaginal fluid

An ELISA for measuring Nisin both in vaginal secretions as well as in circulation was standardized. Rabbit polyclonal antibodies were generated against Nisin and used to measure the rate of absorption, retention time and disappearance from circulation.

To study the bioavailability of Nisin, the female rabbits were divided into four groups of two animals each, one animal in each group was used for mating and the second for evaluating in-vivo stability and retentive capacity of the effective concentration of Nisin present in the vaginal flushing. Nisin levels were estimated in vaginal secretions at 0.15 h, 6 h, 24 h and 48 h following intravaginal application of 1 mg of Nisin (Table 5). Highest levels were seen at 0.15 h declined at 6 h and were undetectable by 24 h. The animals mated at 0.15 h and 6 h did not become pregnant (Table 6). Currently these results are being confirmed in a larger group of animals.

Circulatory levels of Nisin in rabbits

In another group of three female rabbits, blood samples were collected at 0.5, 1, 3, 6, 12 and 24 h following vaginal application of 50 mg of Nisin and serum levels estimated by ELISA. Peak Nisin levels were detected at 1 h and the levels declined rapidly thereafter reaching baseline levels by 24 h (Fig. 54).
Table 5: Nisin levels in the vaginal fluid of rabbits collected at different time intervals after intravaginal application of 1 mg of Nisin

<table>
<thead>
<tr>
<th>Vaginal fluids collected after Nisin administration (h)</th>
<th>Nisin levels in vaginal fluids (µg/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.15</td>
<td>900</td>
</tr>
<tr>
<td>6</td>
<td>48</td>
</tr>
<tr>
<td>24</td>
<td>Not Detected</td>
</tr>
<tr>
<td>48</td>
<td>Not Detected</td>
</tr>
</tbody>
</table>

Table 6: Mating of rabbits at different time intervals after intravaginal application of Nisin and its effect on pregnancy outcome

<table>
<thead>
<tr>
<th>Time of mating after intravaginal administration of Nisin (hr)</th>
<th>Outcome of pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.15</td>
<td>No pregnancy</td>
</tr>
<tr>
<td>6</td>
<td>No pregnancy</td>
</tr>
<tr>
<td>24</td>
<td>Pregnant</td>
</tr>
<tr>
<td>48</td>
<td>Pregnant</td>
</tr>
</tbody>
</table>

Fig. 54: Circulatory levels of nisin in serum following intravaginal administration of 50 mg of nisin, as measured by ELISA. Each value represents the mean of six observations.

Sub-acute toxicity studies of Nisin

Intravaginal application of Nisin (50 mg/animal/day) once daily for 14 consecutive days had no adverse effect on the survival, weight gain, hematological and serum biochemical parameters of rabbits (n = 6). The kidney
function (blood urea nitrogen and creatinine), liver function (alanine aminotransferase, aspartate aminotransferase, alkaline phosphatase) and nutritional status (total serum proteins) were not affected. No histopathological lesions were observed in the vaginal tissue. The treated animals when cohabitated with males 24 h after the last intravaginal application of Nisin, became pregnant and the treatment had no effect on neonatal survival. The gross appearance and growth of the pups was unaffected and was similar to that of the controls.

Subchronic (13 week) toxicity studies following oral administration of Nisin in rats

Mature male (n=6) and female (n=6) rats were treated with aqueous solution of Nisin by oral gavage at a dose of 5 mg/kg/day for 13 weeks. No significant change in body weight, organ weights (liver, kidney, spleen, testis, epididymis, prostate, seminal vesicles, ovary and uterus), hematological and serum biochemical parameters was observed. There was no change in the length of the estrus cycle (117 ± 7 h vs 120 ± 9 h in control). The reproductive performance of the treated animals remained unaffected.

Characterization of vaginal epithelial cells

Human vaginal cells (ectocervical, endocervical and epithelial) were obtained as a gift from Raina Fichorova, Harvard Medical School, USA. The cells had been immortalized using human papilloma viral (HPV) genes and shared many similarities with normal vaginal cells and expressed several cell surface markers. These cells were grown and maintained successfully.

Spermatozoa are more susceptible to Nisin than RBCs and vaginal epithelial cells (Annual Report 2001-2002, p.68). The selective action of Nisin towards spermatozoa, even at low concentrations without affecting the RBCs and vaginal cells remains unknown. Affinity of Nisin to these cells was evaluated by MTT (3-[4,5-dimethylthiazol-2-4]-2,5-diphenyl tetrazolium bromide) assay. It was observed that higher concentrations of Nisin were required to affect the viability of RBCs and vaginal cells compared to spermatozoa (Fig. 55). This could be attributed to the differences in the phospholipid content and the net anionic charge. Studies with the liposome model are in progress, to elucidate the exact mechanism involved in the affinity driven peptide-membrane interaction.

Effect of Nisin on multi drug resistance pathogens

Nisin inhibits the growth of various pathogens (Annual Report 2001-2002, p.67). During the year, the effects of Nisin on the growth of several standard strains including, E. Coli (ATCC 25923), S. aureus (ATCC 25923) P. aeruginosa (ATCC 27853) C. albicans (ATCC 90028) and C. tropicalis (ATCC 750) and clinical isolates
Fig. 55: The effect of Nisin on the viability of sperm, RBCs, ectocervical, endocervical and vaginal cells as determined by MTT assay.

including multi drug resistant organisms were studied by micro dilution method, followed by colony count on specific agar plates. The inhibition in the growth of microorganisms was determined by measuring the absorbance at 630 nm (Fig. 56) and defined in terms of the minimum inhibitory concentration.

This was further confirmed by decrease in colony counts with increasing concentrations of Nisin (Fig. 57). Killing of pathogens was evaluated as per cent of initial colony counts. A concentration of 100 µg /ml completely inhibited the growth of pathogens. In case of multidrug resistant strains, a higher concentration of 150-200 µg of Nisin was effective. The results suggest that, Nisin is a safe and effective vaginal contraceptive and has microbicidal properties.
3.6 Identification, Purification and Characterization of Antifertility Compounds with Microbicidal Activities

Principal Investigator: K.V.R Reddy
Project Associates: Clara Aranha, R. Dinesh and Smita Mahale
Collaborator: Sujata Baveja, K.E.M. Hospital
Duration: 2001-2006

Cationic peptides have been found in all forms of life from bacteria to man and are probably conserved during nature’s struggle to control aggressive microorganisms. A peptide was identified and isolated from the hemolymph of Indian mud crab, *Scylla serrata* and demonstrated to have both spermicidal and microbicidal activities (Annual Report 2001-2002, p.69). SDS-PAGE analysis of the Biogel P-30 purified protein fractions showed three bands less than 30kDa. Further purification of the Biogel P-30 fractions on RP-HPLC using Vydac C18 and C8, columns was attempted. No separation was achieved as the protein seems to be more hydrophilic. Therefore attempts are underway to separate Biogel P-30 fractions using C4 column.
3.7 Phase II Clinical Trial on Praneem Polyherbal Tablet for Assessment of its Efficacy in Symptomatic Women with Abnormal Vaginal Discharge (ICMR Multicenter Study)

Principal Investigator: Kamal Hazari


Duration: 2001-2003

Phase I clinical trial, carried out at this Institute and PGI, Chandigarh, evaluating the Praneem polyherbal tablet (PPT) inserted vaginally once daily for 7 consecutive days, showed that PPT was safe for vaginal use with no local side effects on vaginal and cervical epithelium, blood vessels or on the metabolic parameters studied.

In view of these encouraging observations, the Phase II multicentre clinical trial for the assessment of efficacy of PPT in symptomatic women with abnormal vaginal discharge was conducted at 6 centers, with 25 women at each center (coordinated by the ICMR). Detailed history of the women including gynecological examination and microbiological tests prior to the use of tablets was conducted. Praneem tablets were inserted once daily for 7 consecutive days, following which the women were re-examined and the symptoms and side effects, if any, recorded.

Among the 25 women enrolled at our Institute, 22 had completed the correct use of PPT for 7 consecutive days. Relevant findings are shown in Tables 7, 8 and 9.

Table 7: Salient observations among 22 women who had completed 7 days consecutive use of praneem polyherbal tablet

<table>
<thead>
<tr>
<th></th>
<th>Pre-use %</th>
<th>Post-use %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms/complaints</td>
<td>100</td>
<td>40.9</td>
</tr>
<tr>
<td>Positive clinical findings</td>
<td>27.3</td>
<td>09.1</td>
</tr>
<tr>
<td>Abnormal Vaginal discharge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frothy (TV)*</td>
<td>04.5</td>
<td>00.0</td>
</tr>
<tr>
<td>Curdy (CA)*</td>
<td>04.5</td>
<td>00.0</td>
</tr>
<tr>
<td>Abnormal findings in cervix</td>
<td>63.6</td>
<td>31.8</td>
</tr>
<tr>
<td>BV* positive (Amine test)</td>
<td>13.6</td>
<td>09.1</td>
</tr>
<tr>
<td>BV* positive (Nugents score)</td>
<td>04.5</td>
<td>00.0</td>
</tr>
</tbody>
</table>

BV* = Bacterial vaginosis  TV* = Trichomonas vaginalis  CA* = Candida albicans
Table 8: Aesthetic assessment with praneem polyherbal tablet treatment among 22 women who completed 7 days consecutive use

<table>
<thead>
<tr>
<th></th>
<th>Pleasing</th>
<th>Displeasing</th>
<th>No opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odour of tablet</td>
<td>17</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Shape of tablet</td>
<td>16</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Feeling after insertion</td>
<td>11</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Packaging</td>
<td>19</td>
<td>Nil</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 9: Satisfaction with praneem polyherbal tablet treatment among 22 women who completed 7 days consecutive use

<table>
<thead>
<tr>
<th></th>
<th>Fully</th>
<th>Partially</th>
<th>Not satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction with treatment</td>
<td>11</td>
<td>9</td>
<td>2</td>
</tr>
</tbody>
</table>

The overall data indicates a significant relief in symptoms and improvement as assessed by laboratory findings among the women who completed the therapy and majority of them were satisfied with the aesthetics of the tablet.

3.8 Phase I: Expanded Safety and Acceptability Study of 6 per cent Cellulose Sulfate (Funded by CONRAD-WHO)

Principal Investigator: Kamal Hazari
Project Associates: Shanta Chitlange, Shubhangi Kalgutkar, Jayanti Mania, Virginia Kiro, Chitra Thosar, Mangala Honawar, Prerna Gade, Nancy Masih and Sunita Unde
Collaborator: Maya Lulla, Consultant
Duration: 2002-2003

This is a multicenter study conducted at two centers in Africa and third at this Institute. The objectives of the study were to: (i) determine and compare the effect of twice daily vaginal applications of 3.5 ml 6 per cent CS or K-Yâ Jelly for seven consecutive days on symptoms and signs of irritation of the external genitalia, cervix, and vagina, and epithelial disruption as seen on colposcopy in women when no intercourse is permitted; (ii) determine and compare the effect of twice daily vaginal applications of 3.5 ml 6 per cent CS or K-Yâ Jelly for seven
consecutive days on symptoms and signs of irritation of the external genitalia, cervix, and vagina, and epithelial disruption as seen on colposcopy in women when intercourse is permitted; (iii) assess changes in vaginal health by results of wet mounts and gram stains in both study populations, women abstaining from intercourse and women engaging in intercourse, following twice daily vaginal applications of 3.5 ml 6 per cent CS or K-Yâ Jelly for seven consecutive days; and (iv) to assess the acceptability of twice daily vaginal applications of 3.5 ml 6 per cent CS or K-Yâ Jelly for seven consecutive days in women abstaining from intercourse and women engaging in intercourse.

A pre study site visit and investigators meeting was held in July 2002 for 5 days, to review study procedures in detail with the WHO coordinator (Dr Isaac Malonza). He visited both the recruiting clinics and the group reviewed screening procedures. A mid study monitoring visit was also conducted for 2 days in December 2002.

The study has just been completed, 60 women have been enrolled, 30 for cohort I and 30 for cohort II. This being a phase I study, 493 women were contacted at their houses to request for participation in the study. Among these, 110 came to the clinic for screening and 62 were found eligible and agreeable to participate. The data is being analyzed centrally by WHO-CONRAD for all the 3 participating centers.

3.9 Stigma Attached to HIV/AIDS: Implications for Health Care and Social Adjustment (Funded by ICMR Task Force)

Principal Investigator: S. L. Chauhan

Project Associates: Ranjana Kaushal, Rashmi Jaydeokar, and Ramesh Tadke

Duration: 2002-03

A multi-centric study, co-ordinated by ICMR, is being conducted with the broad objective of assessing the nature of stigmatization, discrimination and denial occurring in relation to HIV/AIDS in different settings and how it affects the individuals with HIV/AIDS in relation to seeking health care and social adjustment. The findings of the study will fill important gaps in current knowledge and provide critical information for design of strategies for overcoming the effects of HIV/AIDS related stigma.

Qualitative and quantitative research techniques that are being used to elicit responses are in-depth interviews of HIV sero-positive/AIDS patients (90); caregivers at hospital (60), at home (20), counsellors (20) and interviews of respondents representing the general population (400 households). Data has been
collected from 55 HIV sero-positive persons, 10 caregivers at hospital and 200 individuals representing the general population.

Preliminary findings of the study indicate that, 26 out of 55 respondent persons living with HIV (PLWHIV) did not reveal their sero-positive status to any of their family members or at their work place or in the community. The main reasons given were: fear of being thrown out of the house or the community; fear of loosing the job and being neglected. Twenty nine PLWHIV shared their HIV status with either their spouse, parents, relatives or friends. The reaction at home was in the form of: did not believe or shocked; got scared; stopped talking; and frequent quarrels/verbal/physical abuse (Fig. 58).

The community reacted by keeping a distance; stopped inviting to social functions; verbal abuse; and total neglect. In the hospital/clinic setting, 44 PLWHIVs perceived reactions, among them 14 experienced sympathetic attitude, mostly from Doctors while 30 respondents perceived negative reactions. The stigma related actions and reactions in the form of fear, anger and hate were experienced more at the hands of ward boys and ayahs. Regarding, mode of transmission as perceived by all 55 respondents, 37 (31 males and 6 females - all CSWs) felt that they contracted the infection through high risk sexual behaviour. Fifteen female respondents, all being housewives felt that they were infected by their husbands and three respondents gave blood transfusion as their source of infection. Thirty four respondents suggested support in terms of free medicines, government shelter homes, free education and food for their children. As far as counseling was concerned, majority felt that better counselling, particularly post-test counselling should be provided not only to the infected individuals but also to their family members, particularly their spouse and close relatives.

![Figure 58: (A) Sharing of HIV positive status (n = 55). (B) Modes of HIV transmission as perceived by HIV positive respondents (n = 55).](image-url)
Some of the initial findings from the general population survey (n=200) where majority belonged to the lower socio-economic class are: - a very high awareness about HIV/AIDS (97%) and about mode of transmission (80 % to 86%). However, some misconceptions do prevail regarding transmission of disease, for e.g. only 53 per cent female and 68 per cent male respondents think that HIV is not transmitted through mosquito bite and 70 per cent female and 79 per cent male respondents feel that HIV can be contracted by sharing meals with HIV infected person. The knowledge regarding identification of a infected person is not satisfactory among females, as only 46 per cent among them felt that a healthy looking person could be HIV positive as compared to 76 per cent male respondents (Fig. 59 A). Only 43 per cent female respondents as compared to 72 per cent males are in favour of maintaining confidentiality of HIV infected person (Fig. 59 B). Half of the female respondents (51%) as compared to 87 per cent males felt that the disease is God’s punishment for their wrong deeds (Fig. 60). When asked regarding PLHIVs segregation in hospital, 65 per cent male respondents felt that they should be treated in separate hospitals or wards as compared to 50 per cent of the females.

Fig. 59: (A) Healthy looking person can also be HIV positive (n = 200), (B) Confidentiality of HIV positive person to be maintained (n = 200).
Fig. 60: HIV/AIDS is due to sinful act for which it is God’s punishment and HIV positive person should be condemned (n = 200).