TECHNOLOGY DEVELOPMENT DIVISION

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Technology Development Division was established under Vaccine Research Centre in April, 2012. Currently, the main work is purification of hepatitis B surface antigen (HBsAg) from plasma for hepatitis B vaccine production. It involves in vaccine immunogenicity studies, research on communicable diseases mainly on viral hepatitis and reproductive tract infections as well as non-communicable diseases mainly on cancer research.

RESEARCH PROJECTS

1. COMMUNICABLE DISEASES

1.1 . VIRAL HEPATITIS

1.1.1. Laboratory scale production of plasma-derived hepatitis B vaccine (2016)

Plasma-derived hepatitis B vaccine was produced as laboratory scale by purification of hepatitis B surface antigen (HBsAg) from plasma. HBsAg positive blood was collected from blood banks of Central Women Hospital, North Okkalapa General Hospital, and Insein General Hospital. In 2016, after 47visits of blood collection, 495 units of HBsAg positive blood were attained. Among them, 33 units of blood obtained for vaccine production after assessing with Counter–Current Electrophoresis (CEP) test for high HBsAg titre. Among them, CEP (+1) are 7 units, CEP (+2) are 15 units, CEP (+3) are 11 units. There were 7.04 liters of plasma acquired for production pool after plasma separation. From Purified HBsAg Lot number P01/14, four formulations followed by vialing procedures were performed in 2016. A total of 5562 of plasma-derived hepatitis B vaccine 5 mL vials were produced in 2016. From them, 33 hepatitis B vaccine 5 mL vials were sent to QC Division. Vaccine 62 vials were remained from 2015. In 2016, total 4,558 vials of hepatitis B vaccine (5mL/vial) were issued to Vaccine and Diagnostic Clinic, DMR.

1.2. REPRODUCTIVE TRACT INFECTION

1.2.1. Screening of *Chlamydia trachomatis* infection among women attending cervical cancer screening clinic, Department of Medical Research

Chlamydia trachomatis infection is one of the most common curable sexually transmitted bacterial infections and represents an enormous public health problem in developing countries. It can be easily cured and timely diagnosis followed by proper treatment can prevent long term reproductive sequelae but nature of the infection is asymptomatic. Untreated Chlamydial infections can lead to serious complications and transmission of infection to sexual partners. This study aimed to determine the seroprevalence of *Chlamydia trachomatis* infection among patients who come to Cervical

Cancer Screening Clinic, Department of Medical Research. The *Chlamydia trachomatis* IgM and IgG were determined in sera by qualitative ELISA. Among 347 participants, 6.3% (22/347) was positive for IgM and 20.2% (70/347) was positive for IgG. *Chlamydia trachomatis* IgM was positive in 6.3% (13/206) of women with STI symptoms and 6.4% (9/141) of asymptomatic women. *Chlamydia trachomatis* IgG was positive in 19.4% (40/206) of women with STI symptoms and 21.3% (30/141) of asymptomatic women. Among the total of 347 patients, 40-49 years group comprising 38.9% (135/347), 30-39 years group comprising 35.2% (122/347), 50-59 years group comprising 15.3% (53/347) and 8.1% (28/347) from 20-29 years group. Only 3 (0.9%) patients were under 20 years and 6 (1.7%) were 60 years and above. This study identified the current situation about prevalence of *Chlamydia trachomatis* infection in Cervical Cancer Screening Clinic attendees. It also showed the proportion of infection in asymptomatic group indicating that screening of the high risk population is necessary to assure early diagnosis and timely treatment although they are asymptomatic. Community based prevalence surveys, infection screening in antenatal clinics, fertility clinics, STI clinics and medical checkup during recruiting new workers will be useful to get the data to estimate the infection burden and also beneficial for early diagnosis and timely treatment for the individuals.

1.3 PENTAVALENT VACCINE

1.3.1 Immunogenicity of pentavalent vaccine (DPT, HepB, Hib) used in EPI programme in under five years old children

Pentavalent vaccine (against Diphtheria, Pertussis, Tetanus, Viral Hepatitis B and *Haemophilus influenze* Type b) was introduced in Myanmar since November, 2012 by incorporating in Expanded Programme on Immunization (EPI). Combination vaccines reduce not only the workload of immunization programme but also the risk for the child by decreasing the number of injections and the cumulative exposure to preservatives and stabilizers that may contribute to adverse events. This study aimed to assess the antibody status of children less than 3.5 years of age after completed immunization with pentavalent vaccine according to EPI schedule. One hundred and twenty children attending to Yankin Children Hospital included in this study after excluding the diagnosis which assumed to effect the immunity (like congenital or acquired immunodeficiency, malnutrition, diseases needing blood or blood product transfusion or immunosuppressive therapy). Quantitative enzyme immunoassays were performed for Anti-Diphtheria toxoid IgG, Anti-Bordetella pertussis IgG, Anti- Tetanus toxoid IgG, Anti- HBs IgG and Anti- Hib-PRP IgG. There were 75.8% (91/120), 90.8% (109/120) and 88.3% (106/120) of the children in this study had protective antibody titres (more than 10 mIU/mL, 0.1 IU/mL and 0.1 IU/mL) for anti-HBs, Anti-Diphtheria toxoid and Anti-Tetanus toxoid respectively. The geometric mean titres were 158.04 mIU/mL, 0.57IU/mL and 0.80 IU/mL (for anti-HBs, Anti-Diphtheria toxoid and Anti-Tetanus toxoid antibodies). Regarding for Anti-Bordetella pertussis, 57.5% (69/120) of the children showed more than 15 U/mL antibody level and geometric mean titre was 27.24 U/mL. Antibody to *Haemophilus influenzae* Type b polysaccharide with level of more than 1U/mL was found in 82.5% (99/120) of children and geometric mean titre was 4.04 U/mL. Most of the children in this study showed protective antibody levels after complete immunization with pentavalent vaccine administered according to EPI schedule. In this study, the geometric mean titre (GMT) of the antibodies gradually fell with the age group of children. Anti-Diphtheria toxoid IgG fell from 1.28 IU/mL to 0.55 IU/mL, 0.42 IU/mL and 0.31 IU/mL in younger than 12 months group, 12-23 months, 24-35 months and 36-42 months groups. It was also found that the children who got the birth dose of HB vaccine have higher seroprotection rate and higher GMT of anti-HBs (86.7% and 216.20 mIU/mL) in

compare to children who did not get the birth dose of HB vaccine (68.8% and 132.42 mIU/mL). These findings provided supportive evidence for further efficacy studies in EPI vaccines.

2. NON-COMMUNICABLE DISEASES

2.1. CERVICAL CANCER

1.1.1. Rapid diagnosis of Human Papillomavirus (HPV) using the GeneXpert HPV assay in cervical cancer patients

High-Risk Human Papillomavirus (HR-HPV) testing is being introduced as a potential primary screening test for improved detection of cervical pre-cancer and cancer. It is now recommended for cervical cancer screening in several evidence-based guidelines. The GeneXpert HPV Assay is a new, rapid, qualitative, real-time Polymerase Chain Reaction (PCR) assay for the detection of 14 genotypes of HR-HPV DNA. This study aimed to establish the rapid diagnosis of HR-HPV genotypes using GeneXpert HPV Assay in cervical cancer patients by a cross-sectional descriptive method. In total, 106 women with histologically confirmed cervical cancer (median age 53 years; range 20-79) from Central Women Hospital (Yangon) and East Yangon General Hospital were investigated in 2016. Among them, 97/106 (91.5%) had no history of cervical cancer screening. Most cervical cancer patients were 50-59years (37/106) 34.9% of age group, followed by 40-49years (28/106) 26.4%, 60-69years (22/106) 20.8%, 30-39years (9/106) 8.5%, 70-79years (8/106) 7.5% and 20-29years (2/106) 1.9%. Histologically, invasive squamous cell cancer, adenocarcinoma and adenosquamous cancer of the cervix were 86.8%, 12.3% and 0.9% respectively. Cervical cells were obtained from the head of uterine cervix by sterile disposable cytobrush and collected in SurePath solution bottle. HR-HPV DNA testing was performed by GeneXpert HPV Assay in which E6/E7genes of the 14 targeted HR-HPV genotypes were amplified simultaneously in five fluorescent channels: (1)HPV-16; (2)HPV-18/45; (3)HPV-31/33/35/52/58; (4)HPV-51/59; and (5)HPV-39/56/66/68. A specimen adequacy control was detected in a sixth channel. HR-HPV was identified in 85.8% (91/106) of cervical cancer patients. The most prevalent HPV genotype was HPV-16 (63.7%), followed by HPV-18/45 (17.6%), HPV-31/33/35/52/58 (9.9%), HPV-51/59 (4.4%), and HPV-39/56/66/68 (1.1%). Mixed HPV-16 with other HR-HPV genotypes was 3.3%. This study highlighted that most of cervical cancer patients had no history of cervical cancer screening and vaccine preventable genotype, HPV-16 was the most prevalent genotype. Therefore, Point-of-Care (POC) test for cervical cancer screening and HPV vaccination program should be established in Myanmar. This study suggests that GeneXpert HPV Assay is very useful for the rapid diagnosis of HR-HPV because it is simple, rapid, and non-batch test and it can be completed in one hour, permitting POC test, which can facilitate same day cervical cancer screening and management strategies.

SERVICES PROVIDED

ACADEMIC

Sr. No.	Name	Course	Responsibility
1.	Dr. Mu Mu Shwe	Dr.Med.Sc (Obstetrics & Gynaecology), DSMA	Co-Supervisor
		Dr.Med.Sc (Rheumatology), UM (1)	Co-Supervisor
		PhD (Pathology), DSMA	Co-Supervisor
		Protocol board meeting, PhD (Pathology), DSMA	Protocol Review
		Journal of Infection and Public Health (JIPH) (Reviewed 5 articles in 2016)	Reviewer