Coronavirus mechanism of infection

Corona viruses are the group of virus which is a group of viruses that have a crown like appearances when viewed in under the electronic microscope. They belong to the Coronaviridiae family. Corona virus causes the Severe Acute Respiratory Syndrome (SARS) [4]. They are commonly known to cause the respiratory disease in human being. Some time they also caused the gastrointestinal disease in different farm animals. They contain +ve single standard enveloped RNA as their genetic material. The genome of corona virus is the largest among the viruses (27-32 in length). Large, roughly spherical, enveloped particles with a nuleocapsids and large, petal like spike 20nm long, protruding from the membrane appearing as the crown [1]. These viruses are host or tissue specific based on the receptor specificity of their spike or S protein. It is an enveloped viruses and the envelope is made up of glycoprotein. (reference?)

REVIEW OF LITERATURE:

The microscopic particle inactive outside because they are incapable by replicating by their own. They take the help of the cellular mechanism for their own benefits. Human corona viruses of OC43 are generally occurs in the respiratory tract of the human being. The virus envelope is made up of S: Spike protein, receptor binding, cell fusion, major antigen, and major antigen, E: small envelope associated protein, M: membrane protein helps in budding and envelope formations, HE: Haemagglutinin-esterase and genome is associated with phosphoprotein N [2]. The virus primarily infects the upper respiratory human. Significant range of common cold is caused y this virus. Unlike to the rhinovirus the corona virus are difficult to grow in laboratory. Infection with corona virus causes the alteration in the transcription and

translation patterns in the cell cycle. They interfere cytoskeleton, apoptosis, coagulation and inflammation and stress responses [3].

MECHANISM OF CORONA VIRUS:

The host and pathogen interaction causes the disease. When once it entered in to the host body, the phases it follows replication and assembly. Fist in the cytoplasm the virus particle is uncoated and the RNA genome is liberated in to the host cytoplasm . The corona virus RNA contain a 5-methylated cap and a 3-polyadenylated-A tail to make it look as much like the host RNA. This helps the RNA to attach to the ribosome for translation. Infection cycle of CoV is started by the binding of the receptor ACE2. Human ACE2 (is a carboxy monopeptide) function as an efficient receptor for the 2002-2003 SARS-Co. ACE is widely found in the Central Nervous System[1]. It is expressed with highest level in the lung, kidney, heart and gastrointestinal system. The entry of corona virus is mainly driven by the S glycoprotein which is a fusion protein of class1. The receptor binding domain in SARS-COV, S protein has been mapped to residues 318-510. It is determined in that different groups of corona virus the receptor domain occurs in different region of the S1 subunits [4]. The ectodomain of the S2 subunit contain two heptad repeat (HR) regions. A sequenced motif of the containing coiled coil and a fusion peptide is predicted to be located immediately upstream of the fist HR region. The binding of the S1 subunits to the receptor can trigger a series of conformational changes of that may result in the formation of an antiparallel heterotrimeric six helix bundles by the two HR regions [1]. The structural changes of the S1 domain generate energy that drives the fusion of viral and cellular lipid membranes. In this process body cholesterol is

appears to be an essential factor. The component essential for SARS-CoV infection is the angiotensin-converting enzyme 2(ACE2). SARS-CoV does not contain hemagglutinin-esterase-like attachment factor. It was found that the presence of L-SIGN allows very efficient entry of the virus. Some virus takes the path of endosome and some at the plasma membrane. The infection mediated by his virus could be inhibited by specific inhibitor of the pH-sensitive endosomal protease cathepsin L. Angiotensin I converting enzyme 2 is an exopeptidase that catalyses the conversion of angiotensin 1 to the nonpeptide angiotensin. The protein cleaved angiotensinI to angiotensin1-9, angiotensinII to angiotensin 1-7. It is belived to regulate the rennin-angiotensin system by counter balancing ACE activities [2] . Replication of the virus starts with the entry to the cell. Corona virus has a protein replicase in its genome that allows the RNA viral genome to be transcribed into new RNA copies using the host cells machinery. Fist the replicase protein is made when the gene encoding the replicase is translated. Then the translation is stopped by a stop codon. Corona virus transcription is involving a discontinuous RNA synthesis [1]. There is base pairing during transcription. N proteins of virus help RNA synthesis. It has RNA chaperone activity that may be involved in template switch. Corona virus initiates the translation by cap-dependent mechanism [2].