Common Vaccinations in Infants and Children- A Brief Review

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ABSTRACT

There is an increasing worldwide realization that immunization uptakerates in children and infants are less than required for adequate control of vaccine preventable diseases. Vaccinesconsists of attenuated, inactivated or killed organisms modified toxins or subunits. Goodvaccines are simple to administer, free of toxic components and induces permanent immunity.Childhood vaccinations not only protect a child from deadly diseases like polio, tetanus anddiphtheria but also prevents its spread to other children. Various vaccination programs areconducted in community hospitals and even private hospitals near us. Common vaccines inpresent scenario are BCG vaccine, Poliomyelitis vaccine, diphtheria vaccine, pertussis vaccine,tetanus vaccine, measles vaccine, MMR vaccine, Hepatitis B vaccine, varicella vaccine typhoidvaccine etc. The word “vaccine” originates from the Latin Variolae vaccine (cowpox), whichEdward Jenner explained in 1798 might stop variola major. ‘Vaccine’ means all or any biological preparations, made from living organisms, that enhance immunityagainst malady and either stop or, in some cases, treat illness. The vaccines described are about BCG vaccine, OPV vaccine,Hepatitis B vaccine, DTaP and DTwP vaccine, Hemophilus Influenza B vaccine, Rota virusvaccine, MMR vaccine, MR vaccine, Pneumoccal vaccine, Japanese B vaccine, Typhoid vaccineand Varicella vaccine.

Keywords: Vaccine, Immunization, Childhood vaccination, Polio vaccine, BCG vaccine,Poliomyelitis vaccine, Diphtheria vaccine, Pertussis vaccine, Tetanus vaccine, Measles vaccine,MMR vaccine, Hepatitis B vaccine, Varicella vaccine, Typhoid vaccine.

1. INTRODUCTION :

Infant and childhood vaccine uptake rates are insufficient for control of diseases which are preventable by vaccines [1]. The large measles outbreaks in developed countries in the past decade have shown the dangers of many immunization coverage gaps. This has forced quite a few countries to enact, augment, or considerobligatory childhood immunization legislation [2]. Despite this, vaccination has become one of the most ubiquitous and admirable of all health interventions. The reason for this is straightforward: the initial vaccination campaigns were targeted at diseases that had increased mortality and morbidity in communities. The considerable impact of vaccination on diseases that had antecedently been thought-about an inevitable part of way of life was therefore nice, so pronto visible, that public support for protection was overwhelming. Vaccines consists of attenuated, inactivate / killed organisms modified toxins or subunits. Good vaccines are easy to administer, free of toxic components and induces permanent immunity. Childhood vaccinations not only protect a child from deadly diseases like polio, tetanus and diphtheria but also prevents its spread to other children. Various vaccination programs are conducted in community hospitals and even private hospitals near us. Common vaccines in present scenario are BCG vaccine, Poliomyelitis vaccine, diphtheria vaccine, pertussis vaccine, tetatus vaccine, measles

vaccine, MMR vaccine, Hepatitis B vaccine, varicella vaccine typhoid vaccine etc. The word “vaccine” originates from the Latin Variolae vaccine (cowpox), which Edward Jenner explained in 1798 might stop variola major in human beings. Vaccinesare biological compositions, made from live organisms. They increase immunity against illnesses and either halt or, in some scenarios, treat ailments. Vaccines are available in liquid form and can be given, either by injection, by oral, or by intranasal routes. Vaccines defend by inducement effector mechanism(cells or molecules) efficient of apace dominant cloning pathogens or halting their venomous elements. Vaccine - induce B lymphocytes to primarily produce antibodies efficient of binding peculiarly to a toxin or a microorganism [3]. Under most circumstances, inactivated vaccines do not elicit sufficiently high and sustained antibody titers on mucosal surfaces to prevent local infection. Pathogens encounter vaccine induced IgG (immunoglobulin) serum antibodies which neutralize viruses, change bacteria, activate the complement cascade, and limit their multiplication and unfolding, preventing tissue injury and clinical illness. Vaccines that fail to induce sterilizing immunity represent a significant challenge for the development of specific vaccines against chronic viral infections [4].

2. OBJECTIVES :

To obtain a concise information about various vaccinations for infants which include BCG vaccine, OPV vaccine, Hepatitis B vaccine, DTaP and DTwP vaccine, Influenza B vaccine, Rota virus vaccine, MMR vaccine, MR vaccine,Rubella vaccine, Japanese encephalitis vaccine,Typhoid conjugate and Varicella vaccine.

(1) BCG VACCINE :

The regimen for tuberculosis provides 95% cure rates for drug-sensitive TB, it is still considered lengthy and has led to poor adherence for patients [5]. Bacillus Calmette-Guérin (BCG) vaccines continues to be the only vaccine for prevention of TB and is a live attenuated bacterial vaccines. Several BCG vaccines are available worldwide which are based on different strains,commonly used BCG bacteria are Copenhagen (Danish 1331), Pasteur and Glaxo. The vaccine is available as lyophilized powder in a vacuum-sealed dark multi dose vial which is reconstructed with sterile normal saline. The BCG has demonstrated significant effectiveness, consistency across all forms in all age groups is found to be less. Everydosage contains 0.1-0.4 million live viable bacilli. BCG vaccine induces cell mediated immunity. The efficiency of BCG vaccine from severe forms of tuberculosis is about 80% and the risk of death from tuberculosis has highlydeclined. They are injected on deltoid muscle into humorous by stretching skin between thumb and forefinger and inserting the needle 2 mm into superficial layers of the dermis. Local reaction is normal following BCG vaccination. Papule develops in 2-3 weeks eventually breaks into shallow ulcers that heal in 6-12 weeks. Exceptional cases of lupus vulgaris are reported.The vaccine should be stored in the dark between 2° C - 8° C. The diluent should not be frozen. BCG vaccines have 24 months of shelf life. A single dose ought to tend to any or all healthy neonates at birth. If the vaccines can't be administered at birth, it ought to tend at the earliest chance thenceforth. Standard dose of BCG immunizing agent is a dose of 0.05 mL of the reconstituted immunizing agent for <1 year, and 0.1 mL for >1 year. The vaccine should be preferably given with tuberculin syringe or 25G/26G sterile needle and syringe. BCG multi-dose vials should be used. BCG vaccines can be co-administered with serum hepatitis birth dose. Persistent ulceration and ipsilateral axillary or cervical pathology are additional adverse reactionsprobable with subcutaneous injections[6]. Revaccination is not recommended.BCG has also shown effectiveness in preventing leprosy (RR from 20- 80%), Buruli ulcer (RR of 50% in Africa region) and other non-tuberculosis mycobacterial (NTM) infections. Several new vaccine candidates are in development to guard against TB and Leprosy.

(2)OPV VACCINE:

Vaccines offering protection against infantile paralysis are out there for many years. Nevertheless, massive efforts are undertaken in WHO’s Global Poliomyelitis Eradication Initiative (GPEI) to get future generation vaccines that are safe and out there at low prices [7]. Vaccination precludes paralytic

poliomyelitis due to poliovirus serotypes 1-3, especially in the young. Trivalent oral poliovirus vaccine (OPV)is developed by Sabin and inactivated poliovirus vaccine (IPV) is developed by Salk. OPV is a bivalent, live attenuated vaccine of the Sabin strains Type 1 (LSc, 2ab) and Type 3 (Leon 12a, 1b). The vaccine is cultivated in MRC5 human diploid cells. Each dose (0.1 ml) contains 106.0 CCID50 of Type 1 and 105.8 CCID50 of Type 3 strain. It is a clear liquid, yellowish-pink suspension. These vaccines are administered via oral route. They proliferate in the mucosal cells, this is described as the “take” of the vaccine. Mucosal immunity reduces chances of infection on confronting wild type polio-virus which is excreted for short periods and numbers,thus reducingfaeco-oral transmission andthe transmission of wild virus. The Sabin strain is administeredto all ages, for preventionagainst infection by poliomyelitis viruses of Type 1 and 3. It may also be administered to children and adults. Magnesium chloride is used as a stabilizer. Traces of neomycin sulphate and polymyxin B sulphate are present in Polio Sabin One and Three (oral). This vaccine is not analternative for the trivalent poliomyelitis vaccine recommended later. A single dose of vaccine (0.1 ml) consists of two drops.It is delivered via a polyethylene dropper providedwith a multi dose container [8]. As per current recommendation of the Indian Academy of Pediatrics, primary doses are given at birth (zero dose), 6 weeks, 10 weeks, and 14 weeks. A booster dose at second year (15-18 months) and yet another in the fifth year. To ensure reasonably high personal protection from polio-myelitis a total of 6 doses are recommended. OPV is administered as two drops orally. This should be followed with drinking water to confirm ingestion of the vaccine. It iscredibly shown that antibodies in breast milk against infectious disease don't interfere with the take of the vaccines and therefore the initiation of immunological response. The vaccine isgiven to breastfeeding infants, two hours before or after breastfeeding, preventing contact with the antibodies in the breast milk. Though OPV is exceedingly safe, cause mild diarrhea in case of overdose, vaccine-associated paralytic poliomyelitis (VAPP).The vaccine can be given to a lactating mother. Non immune woman of child-bearing age should use contraception for 3 months following OPV vaccination [9].

(3)ENHANCED INACTIVATED POLIO VACCINE (EIPV) (SALK VACCINE) :

Now that eradication of polio is around the corner enhanced IPV (available *aimovax polio*) may be introduced over and above the OPV in the national immunization schedule in addition to routine immunization against polio. It is especially indicated in immune compromised children and for boosting the eradication endeavors.

Dosage as per NIS is 0.1ml intra dermal at right deltoid at 1 and half month and repeated at 3 and half months.Dosage is 0.5 ml (IM) in lateral side of thigh in infants. In children, it is given in the deltoid at 8 and 16 weeks, or 6,10, and 14 weeks. A booster is required at 15 months. It is recommended to be stored at 2-8 degree C [10].

(4) HEPATITIS VACCINE :

As humans being the major reservoir of hepatitis B virus (HBV), a complete control strategy by vaccination could lead to virus eradication. Hepatitis B vaccines (HBV) consist of preparations of "s" antigen (HBsAg). The outer envelope of the hepatitis B virus consists of glycoprotein component - 22-nm spheres.They also contain a hollow form within the blood serum of individuals with acute and chronic infection. HBsAg concentration differs from 2.5 to 40 μg / dose. Since the start of the implementation of universal programs, over half a billion people are immunized. The vaccine is administered intramuscularly. The dosage is 0.5 ml (10 mcg) for children below 10 years, while 1 ml (20 mcg) is administered to those above 10 years. IAP recommendation include dosage at birth, 6 weeks and 14 weeks or 6, 10 and 14 weeks. Or else two doses are given 1 month apart followed by a booster dose after 6 months. Post exposure prophylaxis [11]. According to IAP, a dose of HB vaccine with a separate syringe and needle at different sites on the body is recommended for neonates, in case the pregnant woman is a carrier of the HB virus following HB immune globulin (HBIg) administration within 12 hours of birth. However, HB vaccine can be given as an alternative, if HBIg is unavailable. Although,

HBIg is not a requirement after 12 hours, and instead, the HB vaccine is started. The second dose is given at 4 weeks, and the third, at 5 weeks (4-6 weeks).The third dose of vaccine can be given at the same time as measles vaccine, at or after 9 months. The HB vaccine is not warranted, immediately after birth, if the mother is not a carrier of HB and may be administered at the first visit along with other vaccines given at 6 weeks when a dose of DPT or OPV is pending. The second dose of HB vaccine can be taken 4 weeks later and the third at the time of measles vaccine [12].

(5) Combination Hepatitis B vaccine:

Hepatitis A and B mixtures merges serum hepatitis B and A antigens in formulations for pediatric or adult use. Hepatitis B united with DTP, Hib and/or Salk vaccine - serum hepatitis has been merged with non-cellular or whole cell infectious disease antigens contagious disease.Hepatitis B may be a disease that may cause gentle health problem lasting some weeks, or it will be deadly resulting in a significant, womb-to-tomb health problem. Acute serum hepatitis infections culminate in pyrexia, malaise, nausea, vomiting, jaundice, myalgia, arthralgia and abdominal pain might manifest. The majority WHO maintains to develop chronic serum hepatitis usually don't have any presenting symptoms, however it's still terribly serious and might result in liver injury (cirrhosis), carcinoma, and death. Chronically-infected folks will uncoil serum hepatitis virus to others, though they don’t feel or look sick themselves. Serum hepatitis is transmittedvia blood, semen, or other body fluids. Adverse reactions like transient soreness, erythema, pathology at injection site and Low grade fever would possibly occur.

(6) DTaP and DTwP VACCINE:

In 1991, the primary contagion, tetanus and single-celled respiratory disease vaccines (DTaP) were commissioned to be used within the North American nation. DTaP immunogen will facilitate shield your kid from contagion, tetanus, and respiratory disease.

DIPHTHERIA (D): Cause respiration issues, paralysis, and heart condition. Before vaccines were introduced,the contagion executed tens of thousands of youngsters once a year in US.

TETANUS (T): Causes painful spasm of the muscles. It causes “locked jaw”. One in five persons dies of tetanusaccording to World Health Organization(WHO).

PERTUSSIS (aP): additionally, called respiratory disorder. It causes severe coughing spells in infants and kids leading to a difficulty in eating, drinking, or breathing. It will trigger respiratory illness, seizures, brain injury or death. Most kids immunized with DTaP are protected throughout childhood. Five doses of DTaP immunogen, each at the following intervals: two months, four months, six months, 15–18 months,4–6 years. DTaP can be taken with different vaccines. DTaP immunogen isn't applicable for everyone—a tiny range of youngsters ought to receive a unique immunogen that contains solely contagion and tetanus rather than DTaP. The vaccine may be administered in a mildly sick child, while those suffering from more severe infections may have to wait for the disease to subside before they may be immunized. A dose of 0.25 to 0.5 cubic centimeter of the triple immunogen is given deep intramuscularly over the lateral thigh or the deltoid. The sole contraindications to DPT protection are severe reaction to previous DPT injection and Progressive medicine diseases. Fever and convulsions, local painful swelling, even sterile injection symptom,occasionally one to three hours after injection, collapse (of which the symptoms include pallor, sweating, slow pulse) from which the child invariably recovers in 1-2 hours, allergic rubella, Pseudotumor cerebri and encephalitis. The immunogen is best hold on at a temperature of 2 to 10° C. DTwP vaccines contains whole cell of pertussis,rather than DTaP which contains only a part of pertussis organism[13].

(7)HAEMOPHILUS INFLUENZAE TYPE B (Hib) VACCINE :

Haemophilus influenzae blood type will cause various varieties of infections as well as inflammation, pneumonia, sepsis, and infectious disease [14]. The Hib conjugate vaccinum is considered to be protecting and safe. These infections typically have an effect on both youngsters beneath five years as well as on adults with sure medical conditions. A minimum of four conjugate carbohydrate HIB vaccines are offered, particularly (1) contagious disease antigen conjugated vaccinum (PRP-D), (2) sugar conjugated vaccinum (HbOC), (3) meningococcal

OMPconjugate vaccinum, and (4) tetanus antigen conjugated vaccinum (HiB-TT, PRP-T)[15]. Hib microorganism will cause gentle malady, like ear infections or respiratory disease, or they'll cause severe malady, like infections of the blood. Severe Hib infection, additionally known as invasive Hib malady, needs treatment in a very hospital and may generally lead to death. The WHOstates that advantages of vaccination vastly outweigh the risks, as evidenced by evaluations of effectiveness and safety.Before Hib vaccinum, Hib malady was the leading explanation for microorganism infectious disease among youngsters.Within the U. S infectious disease is associated with high degree infection of the liner of the brain. It will cause brain harm and hearing loss [16]. The vaccine is run in three doses, at 6, ten and fourteen weeks. Booster is usually recommended at 15 -18 months. If the kid initial reports between 6 and12 months, solely a pair of primary injections and >1 year, just one injection is usually recommended Hib vaccine could also be given as a complete vaccine, or as a part of a mix vaccine (a style of vaccine that mixes quite one vaccine along into one shot). Infants can typically get their initial dose of Hib vaccine at a pair of months mature, and can typically complete the series at 12-15 months mature. Youngsters over five years previous and adults typically don't receive Hib vaccine.However, it is recommended to administer the vaccine in persons with asplenia, erythrocyte abnormality, prior tosplenectomy, or following a bone marrow transplant. Hib vaccineis also recommended in persons suffering from HIV, between ages five and eighteen. HIB vaccine is extremely safe, typically inflicting no native or general reaction.

(8)ROTAVIRUS VACCINE:

Rotavirus being the pathogen of the leading cause of severe gastroenteritis in children <5 years of age worldwide, the introduction of vaccines against rotavirus had brought about a drastic change in its number[17]. Rotaviruses are classified on the basis of surface proteins present on the outer layer of the viral capsid. They are non-enveloped RNA viruses. The rotavirus strains are mentioned commonly by type G with G1 to G4, and G9, which accounts for 90% of virus types. A number of Rota virus vaccines have been developed by manufacturers, varying by source and types of the virus used. The currently prequalified oral Rota virus vaccines are live attenuated and include: Rotarix, an attenuated human virus, andRotaTeq, a pentavalent product with reassortant virus from human and bovine origin The impact of vaccination is found to be significant based on evaluation of many parameters.WHO recommends that the first dose of rotavirus vaccine be administered as soon as possible or after 6 weeks of age, along with diphtheria-tetanus-pertussis (DTP) or pentavalent vaccination to ensure efficient protection against the disease.The vaccine manufacturers' conventional age restrictions on the first and last dose of rotavirus vaccines may prevent vaccination of many vulnerable children in settings where the DTP doses are often given late (i.e. after 15 weeks for DTP/penta1; or after 32 weeks for DTP/penta2 or DTP/penta3). WHO encourages early vaccination but allows infants to receive rotavirus vaccine together with DTP/penta regardless of the time of vaccination, thus enabling qualification of those previously excluded from its benefits.The vaccine is contraindicated in anaphylaxis following a previous dose, and severe immunodeficiency including severe combined immunodeficiency (SCID).Children with a history of intussusceptions and other intestinal malformations, chronic gastrointestinal disease, and severe acute illnesses need to be monitored carefully. Vaccination should be withheld in case of an ongoing acute gastroenteritis or fever with moderate to severe illness, until the disease decreases in intensity.

(9)MMR VACCINE :

Diseases like measles, mumpsand rubella can be prevented by MMR vaccine. The recommendation for measles vaccine is at 9 to 12 months of age with revaccination in the form of MMR vaccine is given at 15-18 months. It may be given earlier in high-risk situations but, in that occurrence, after an interval of 6 months. Dosage is 0.5-1.0 ml (SC, ID, IM). Contraindications include any acute illnesses, those on immunosuppressive therapy such as steroids, antimetabolites, alkylating agents, over extended periods of time. Those with history of convulsions, leukemia, active tuberculosis, immune deficiency states (hypo gamma globulinemia,

severe HIV), recent gamma globulin administration are also considered to be valid contraindications. The adverse effects of the vaccine may include allergy/eczema, fever and rash 5-10 days after immunization with vaccine [18].

MUMPS (M) symptoms are similar to those occurring after administration of measles vaccine.It is obtained from the Jeryl-Linn strain (named after the child from whom it was isolated)and is a live, attenuated virus. Its protective value is of the order of 95% and it probably gives long immunity. It is supplied as lyophilized powder which on reconstitution should be used promptly. The dose is 317 TCID (tissue culture infective dose) which should be administered subcutaneously or by jet gun. Mumps vaccine is very safe.

RUBELLA (R) causes fever, inflammatory disease, rash, headache, and eye irritation. In case of rubella in pregnant women can cause fetal anomalies. Kids would like a pair of doses of MMR immunogen, usually: 1st dose at twelve through fifteen months aged, Second dose at four through half-dozen years aged .Infants World Health Organization are traveling outside the U.S once they area unit between half-dozen and eleven months aged ought to get a dose of MMR immunogen before travel[19]. The kid ought to still get a pair of doses at the counseled ages for durable protection.Older kids, adolescents, and adults conjointly would like one or a pair of doses of MMR immunogen if they're not already proof against contagion, mumps, and epidemic rubella. Health care supplier will assist to confirm what percentage doses is required. A 3rd dose of MMR is counseled during bound epidemic parotids eruption things. MMR immunogen is also given at identical time as alternative vaccines. kids twelve months through twelve years aged may receive MMR immunogen at the side of chickenpox immunogen in an exceedingly single shot, referred to as MMRV.

(10) MEASLES–RUBELLA (MR) VACCINE :

Measles-rubella (MR) vaccine is a live attenuated vaccine. It is available either as single antigen vaccine, or as a combination with rubella(MR), or mumps and rubella (MMR), or with mumps, rubella, and varicella (MMRV) vaccine. The protective immune response is unchanged in either.MR vaccine is currently given in two doses - the first, between 9 and 12 months of age, and the second, between ages 16 and 24 months. HIV-infected individuals may also be vaccinated; infants should receive the vaccine at 6 and 9 months of age.The MR vaccine is stored between 2° C to 8°C in amber coloured glass vials due to its light sensitive property. At the session site, the reconstituted vaccine should be kept inside the icepack.MR vaccine is a lyophilized preparation [20]. It is reconstituted with diluents prior to administration. Each ampule of diluents contains>5 mL, which may beutilized to dilute a single vial of MR vaccine. A single dose of the MR vaccine is 0.5 mLgiven subcutaneously, always injected in the right arm for standardization and survey purposes.It is transported in vaccine carriers with four conditioned icepacks for use in the field.

(11)TYPHOID CONJUGATE :

Typhoid fever is an acute generalized infection, caused by an enteric bacterium,Salmonella Typhi (S. Typhi). Children are disproportionately affected by typhoid fever, with peak incidence at ages 5 to <15 years. The decrease in the substantial burden of typhoid fever is a result of the new developments in the medical vaccinology. Typhoid Vi-conjugate vaccines can be used without significant side effects in infants of 6 months. Typhoid Vi-conjugate vaccines are shown to possess significantly higher effectiveness and period of protection than previous vaccines [21]. A live attenuated strain evokes a greater immune response. The Ty21a, was the first live oral attenuated Salmonella vaccine createdfrom the chemical mutagenesis of wild-type S. Typhi strain Ty21a.In infants 6–11 months and children 12–23 months, a single dose elicited high titers of IgG anti-Vi antibody that persisted up to 5 years in 84% of children. Efficacy of 87% was demonstrated in licensed in adult volunteers.

Currently recommended vaccines are:

1. Oral typhoid vaccine: oral S. typhi (Typhoral), and
2. Injectable Vi capsular polysaccharide typhoid vaccine (Typhim Vi, Vac Typh, Typhivax, TyphoVi, Tyvax-Vi)
3. Classical:The whole-cell TA vaccine includes S. paratyphi A is a killed vaccine.

4.Oral typhoid vaccine It contains Ty 21 live attenuated mutant strains of S. typhosa. A single capsule is administered on day 1, 3 and 5, one hour before a meal. It is given every 3 years. Rarely slight gastrointestinal upset and rash may occur but the vaccine is well tolerated. It confers a protection varying from 67 to 95%. It is stored between 2°and 8°C. It is light sensitive and therefore needs to be stored away from light. For quite a few years, it is not available in India. Contraindications include immunodeficiency, immunosuppressant drugs, antimitotics, certain antibiotics and sulfas active against salmonella, acute febrile illness, GIT infection, and pregnancy. Polysaccharide Vi typhoid vaccine contains purified Vi capsular polysaccharide (ViCPS). A dose of 0.5 ml containing 25 meg of ViCP9 is given subcutaneously or intramuscularlyevery 3 years, conferring a protection of 75 to 100%. Mild local pain and rise in temperatureare the known side-effects. It is contraindicated in those with hypersensitivity reactions and pregnant women. They are ideallygiven 5 to 6 years later for optimum protection. Nevertheless, in view of increasing occurrence of typhoid fever under 5 years of age, especially in the Indian subcontinent, starting typhoid immunization at 18-24 months with injectable vaccine in endemic areas is justified. Whole cell killed TA vaccine is quite cheap and manufactured locally in India (though at present its production is suspended). At an interval of 4-6 weeks It is given in two doses 0.25 - 0.5 ml each (SC), starting at 6 months of age or later. Local pain, induration, rise in temperature,myalgia may develop over the next 2-3 days following administration. Reactionsare lower in monovalent (containing endotoxin of S. typhi only) vaccine, acetone killed and dried preparation (AKD vaccine). Revaccination every 3 years is needed.

(12)VARICELLA VACCINE :

Varicella is taken into account as a self-limiting unwellness that annually infects an oversized variety of individuals, principally kids, nearly adequate to the scale of the annual birth cohort in temperate regions. pox immunogen will stop varicella. a major decline in pox incidence has been ascertained in countries wherever pox vaccination has been introduced [22]. varicella will cause associate fretful rash that sometimes lasts a couple of weeks. Symptoms include fever, tiredness, anorexia and headache. Occurrences of herpes zoster (Shingles) years later have been observed. Varicella can be serious in infants below twelve months more matured, adolescents, adults, pregnant ladies, and other people with a debilitated system. It does not occur typically, however folks will die from varicella. the majority United Nations agency area unit immunized with a pair of doses of pox immunogen are protected for all times. kids would like a pair of doses of pox immunogen, usually: 1st dose: twelve through fifteen months more matured, Second dose: four through six years more matured. Older kids, adolescents, and adults additionally would like a pair of doses of pox immunogen if they're not already proof against varicella. pox immunogen is also given at same period as alternative vaccines. Toddler between twelve months and twelve years would possibly receive pox immunogen along with MMR immunogen during a single shot, called MMRV. Only 1 placebo controlled RCT has commented on the danger of shingles following vaccination: no cases were noted in either placebo or immunogen recipients once 9 months.

(13) PNEUMOCOCCAL VACCINE :

It is estimated that every year, 1.6 million deaths occur due to pneumonia. A documented increase in the resistance of *S. pneumonia*commonly attributed to usage of antibiotics warrants the need for vaccination against pneumococcal infection. Conjugated PCV7 and Unconjugated polysaccharide PPV23 are currently available. It is stored between 2° to 8°c and is light sensitive. PPV23 is preferred for primary immunization, givenas a single dose of 0.5 mL, either subcutaneously or intramuscularly. The only absolute contraindicationof PPV23 is a previously documented episode of anaphylaxis.

(14) JAPANESE ENCEPHALITIS :

Japanese encephalitis (JE) is a notifiable disease in India.It is characterized by flu-like symptoms followed by neck stiffness, disorientation, coma, seizures, spastic paralysis and eventual death. Immunization offers long-term protection. There are four major types available –

Inactivated Mouse Brain-Derived Vaccines:

JE-VAX is a mouse-brain derived inactivated

virus vaccine. Three doses are recommended for travellers.Children between ages 1 and 3 years in endemic regions receive 2 doses.

Inactivated Vero Cell Vaccines:

P3 strain of JEV grown in Primary Hamster Kidney cells is used for the preparation of inactivated JE vaccine.

Live Attenuated Vaccines:

SA 14-14-2 strain propagated in Vero cells as well as in primary hamster kidney (PHK) cells. This vaccine has recently been licensed in South Korea, Nepal, Sri Lanka and India.

Chimeric Vaccines:

ChimeriVax™-JE is a single dose lyophilized formulation of a recombinant, attenuated, chimeric virus which consists of structural genes (Pre-membrane and E) from SA 14-14-2 strain. It has proved efficient in use in endemic zones. Unavailability in endemic zones, lead to the development of newer vaccines against JEV infection. It is currently licensed in China, Thailand and India.The below mentioned table gives an idea of the immunizations for children in India.

TABLE 1: National immunization schedule

National Immunization Schedule (NIS) for Infants, Children and Pregnant Women

Vaccine	When to give	Dose	Route	Site
For Pregnant Women				
TT-1	Early in pregnancy	0.5 ml	Intra-muscular	Upper Arm
TT-2	4 weeks after TT-1*	0.5 ml	Intra-muscular	Upper Arm
TT- Booster	If received 2 TT doses in a pregnancy within the last 3 yrs*	0.5 ml	Intra-muscular	Upper Arm
For Infants				
BCG	At birth or as early as possible till one year of age	0.1ml (0.05ml until 1 month age)	Intra-dermal	Left Upper Arm
Hepatitis B - Birth dose	At birth or as early as possible within 24 hours	0.5 ml	Intra-muscular	Antero-lateral side of mid-thigh
OPV-0	At birth or as early as possible within the first 15 days	2 drops	Oral	Oral
OPV 1, 2 & 3	At 6 weeks, 10 weeks & 14 weeks (OPV can be given till 5 years of age)	2 drops	Oral	Oral
Pentavalent 1, 2 & 3	At 6 weeks, 10 weeks & 14 weeks (can be given till one year of age)	0.5 ml	Intra-muscular	Antero-lateral side of mid-thigh
Rotavirus#	At 6 weeks, 10 weeks & 14 weeks (can be given till one year of age)	5 drops	Oral	Oral
IPV	Two fractional dose at 6 and 14 weeks of age	0.1 ml	Intra dermal two fractional dose	Intra-dermal: Right upper arm
Measles /MR 1st Dose$	9 completed months-12 months. (can be given till 5 years of age)	0.5 ml	Sub-cutaneous	Right upper Arm
JE - 1**	9 completed months-12 months.	0.5 ml	Sub-cutaneous	Left upper Arm
Vitamin A (1st dose)	At 9 completed months with measles-Rubella	1 ml (1 lakh IU)	Oral	Oral
For Children				
DPT booster-1	16-24 months	0.5 ml	Intra-muscular	Antero-lateral side of mid-thigh
Measles/ MR 2nd dose $	16-24 months	0.5 ml	Sub-cutaneous	Right upper Arm
OPV Booster	16-24 months	2 drops	Oral	Oral
JE-2	16-24 months	0.5 ml	Sub-cutaneous	Left Upper Arm
Vitamin A* (2nd to 9th dose)**	16-18 months. Then one dose every 6 months up to the age of 5 years.	2 ml (2 lakh IU)	Oral	Oral
DPT Booster-2	5-6 years	0.5 ml.	Intra-muscular	Upper Arm
TT	10 years & 16 years	0.5 ml	Intra-muscular	Upper Arm

3. CONCLUSION :

Common vaccinations in infants and children are quite safe and effective if administered under strict precaution by well-trained doctors and nurses.

REFERENCES :

[1] Strategic Advisory Group of Experts on Immunization. 2017. Assessment report of the global vaccine action plan. Geneva, Switzerland: World Health Organization; 2017.

[2] Delamater PL, Leslie TF, Yang YT. Change in medical exemptions from immunization in California after elimination of personal belief exemptions. JAMA. 2017;318(9):863–4.

[3] Cooper NR, Nemerow GR. The role of antibody and complement in the control of viral infections. J Invest Dermatol. 1984;83(1 suppl):121s-127s.

[4] Geginat J, Paroni M, Maglie S, et al. Plasticity of human CD4 T cell subsets. Front Immunol. 2014;5:630.

[5] Dheda, K., Barry, C. E. &Maartens, G. Tuberculosis(2016).The Lancet 387, 1211–1226, https://doi.org/10.1016/s0140 6736(15)00151-8

[6] Suraj Gupte, The short textbook of pediatrics.13th edition Jaypee publications.pg.164.

[7] Aylward B, Tangermann R (2011). The global polio eradication initiative: Lessons learned and prospects for success. Vaccine 29, Supplement 4: D80-D85. doi:10.1016/j.vaccine.2011.10.005. PubMed: 22486981.

[8] Suraj Gupte, The short textbook of pediatrics.13th edition Jaypee publications.pg no.100-102

[9] Suraj Gupte, The short textbook of pediatrics.13th edition Jaypee publications.pg.no100-101

[10]Suraj Gupte, The short textbook of pediatrics.13th edition Jaypee publications.pg.no100-101

[11]Meireles LC, Marinho RT, Van Damme P. Three decades of hepatitis B control with vaccination. World J Hepatol, 2015;7:2127–2132. DOI: 10.4254/wjh.v7. i18.2127

[12]Suraj Gupte, The short textbook of pediatrics.13th edition Jaypee publications.pg.105-106

[13] DTP (DTwP / DTaP) Vaccine – Vaccinebox [Internet]. Vaccinebox. 2019 [cited 20 December 2019].

[14]Zarei, A. and M.Redwan, E. (2016). Hib vaccines:past, present and future perspectives. Hindi publishing corporation, Article ID 7203587.

[15]Suraj Gupte The short textbook of pediatrics.13th edition Jaypee publications.pg.no105

[16] World Health Organization. Vaccines against influenza. WHO position paper. 2012. http:// www.who.int/immunization/position_papers/ PP_influenza_november2012_summary.pdf

[17]Jonesteller CL, Burnett, E. and Yen, C. (2017). Effectiveness of rotavirus vaccination :A systematic Review of the first decade of global post licensure data 2006-2016. Infective disease society of America.

[18]Atherly DE, Lewis KDC, Tate J, Parashar UD, Rheingans RD. Projected health and economic impact of rotavirus vaccination in GAVI-eligible countries: 2011–2030. Vaccine. 2012;30:Supple:A7– 14.

[19]World Health Organization Measles vaccines. WHO position paper. Weekly Epidemiological Rec. 2009;84(35):349–60

[20] South-East Asia Regional Office of WHO. Strategic Plan for Measles Elimination and Rubella and Congenital Rubella Syndrome Control in the South-East Asia Region 2014–2020. New Delhi: WHO SEAR. 2014

[21]Jin C, Gibani MM, Moore M, et al. Efficy and immunogenicity of a Vi-tetanus toxoid conjugate vaccine in the prevention of typhoid fever using a controlled human infection model of Salmonella Typhi: a randomised controlled, phase 2b trial.

Lancet 2017; 390: 2472–80.

[22] Ramet J, Weil-Olivier C, Sedlak W. Is Europe ready to embrace a policy of universal varicella vaccination? Int J Clin Pract. 2005;59:1326–33.

[23] Bryce J, Boschi-Pinto C, Shibuya K, Black RE; WHO Child Health Epidemiology ReferenceGroup. WHO estimates of the causes of death in children. Lancet. 2005 Mar 26-Apr 1;365(9465):1147-52.

[24]Torzillo PJ, Hanna JN, Morey F, Gratten M, Dixon J, Erlich J. Invasive pneumococcal disease in central Australia. *Med J Aust.* 1995 Feb 20; 162(4):182-6.

[25] Solomon T. Control of Japanese encephalitis--within our grasp? N Engl J Med 2006; 355(9): 869-71.

[26] Mackenzie JS, Gubler DJ, Petersen LR. Emerging flaviviruses: the spread and resurgence of Japanese encephalitis, West Nile. Nat Med 2004; 10(12)(Suppl.): S98-S109.

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