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Immunization and Its Importance: A Literature Review

Pramod Prakash Kanap
Assistant Professor, Department of Kriya Sharir, Hon. Shri. Annasaheb Dange Ayurved medical College, Ashta, Maharashtra, India.

Abstract: ***To remain healthy a person should be able to combat with some common readily occurring infectious diseases. When the germs invade the body of human being they gate multiplied and weakens the natural immunity of the body. To prevent commonly occurring diseases, one must have a strong immunity power. Immunity can be gained by mild infections or it can be acquired by inducing infections. Vaccines that protect against infections as well as disease have better herd effect than those which protect only against disease. WHO officially launched a global immunization program. A recommended schedule of immunization for infants and young children includes vaccine against diphtheria, polio, tetanus, measles, mumps, rubella etc. Vaccination prevents the above diseases and reduces the mortality of children by those diseases. The article reviews concept of immunization, types and its importance in human being.***
Keywords: Immunization, Vaccination, Disease, BCG, Mumps, Typhoid

I. INTRODUCTION

In May 1974 WHO officially launched a global immunization program. It is mainly to protect the all children of world against six vaccine- preventable disease. Namely- diphtheria, whooping cough, tetanus, polio, tuberculosis and measles.
In Indian version, the universal immunization program was launched on November 1985 and was dedicated to memory of Smt. Indira Gandhi. Vaccination also reduces the risk for those individuals who have escaped vaccination or those who have not developed satisfactory protection.
Vaccination or Immunization have played important role in decreasing the mortality of children by preventing the disease. Two or more killed antigens may also be given simultaneously or at any interference between doses.
There are no risks but only some contraindications are suggested. Vaccine acts as “Prevention is better than Cure” mechanism.

II. MATERIAL AND METHODS

Literature regarding concept of Immunization and importance of vaccination e.g. various textbooks, online and printed articles from various journals, indexed citations, internet, google search, various websites etc. was reviewed from available sources.

III. IMMUNIZATION AND VACCINATION

Vaccine is an immunobiological substance designed to produce the specific protection against a given disease [1].
It stimulates the production of protective antibody and other immune mechanism. Vaccine may be prepared from live modified organisms, inactivated or killed organisms, extracted cellular fractions, toxoids or combination of these[2].

A. Types of Vaccine

1) Live vaccine
2) Killed vaccine
3) Toxoids
4) Cellular fractions
5) Combinations
6) Future prospects

Vaccines that protect against infections as well as disease have better herd effect than those which protect only against disease.
Active immunizing agents are known as vaccines.
An ideal vaccine is easy to produce in well standardized preparations.

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B. Vaccinations

Injection of killed microbe in order to stimulate the immune system against the microbe, thereby preventing disease. Vaccination or Immunization work by stimulating by immune system, the natural disease fighting system of the body [2].

C. Immunization

The process of inducing Immunity to an infectious organism or agent in an individual or animal through vaccination a vaccination that induce Immunity.

A recommended schedule of immunization for infants and young children includes vaccine against diphtheria, polio, tetanus, measles, mumps and rubella. [1,2,3,4]

D. Indian National Immunization Schedule

A) For Infant	At birth	BCG & OPV- 0 dose
	At 6 weeks	BCG (if not given at birth) DPT-1, OPV-1 & Hepatitis B-1
	At 10 weeks	DPT-2, OPV-2 & Hepatitis B-2
	At 14 weeks	DPT-3, OPV-3 & Hepatitis B-3
	At 9 months	Measles
	At 16-24 months	DPT & OPV
B) At 5-6 years		DT- the second dose of DT should be given at on interval of one month if there is no clear history or documented evidence of previous immunization with DPT
C) At 10 & 16 years		Tetanus toxoids- the second dose of TT vaccine should be given at an interval of one month if there is no clear history or documented evidence of previous immunization with DPT, DT or TT vaccines.
D) For pregnant woman		Early in pregnancy- TT-1 or Booster. One month after TT-1, TT-2.

Table.1- Indian National Immunization Schedule

E. Specific Protection against Common Diseases and Various Types of Vaccines

1) BCG Vaccine:

a) It is live vaccine used against the tuberculosis. It is a freeze-dried form.
b) It is administrated intra dermally over the deltoid muscle.
c) Dose- 0.1 ml
d) BCG may be given any time from birth since mothers immunity is not transferred to the fetus.
e) Given as soon as possible after birth.

2) OPV- Oral Polio Vaccine:

a) It is given against the polio disease.
b) It is given orally
c) Dose- 0.5 ml
d) OPV given after 6 weeks of birth
e) It is very safe vaccine without adverse reactions

3) Hepatitis -B Vaccine:

a) Hepatitis -B vaccine is given against the disease hepatitis.
b) It is given as soon as possible after birth.
c) There are 3 doses of the vaccine at 0, 1-2 and 6 months of age.

4) Diphtheria Vaccine:

a) The Diphtheria disease is caused by c. diphtheria
b) Dose- 0.5 ml after 6 weeks

c) Three doses of primary vaccination during first year and booster dose at end of 2nd year of life achieves protective antibody that lasts till end of first decade.
d) DPT- diphtheria, pertusis, tetanus vaccine.
e) DT- Diphtheria, tetanus vaccine.
f) There should be interval of 4 weeks between 3 doses.
5) Tetanus Vaccine:
a) Neonatal tetanus is an important cause of mortality in many countries.
b) Tetanus toxin is very toxin, the lethal dose for human being less than 2.5 mg/kg.
c) Dose- in human there is no absolute protective level of tetanus antitoxin.
d) The toxoid is usually administrated combined with toxoid of diphtheria and pertusis killed vaccine is DPT; combination of DT is also available.
e) It is administrated to mother either during her pregnancy or prior to pregnancy during child bearing age.
f) If children are fully protected then TT booster doses are given at 5-10 year intervals.
g) Dose- 0.001 IU/ml.
6) Measles Vaccine:
a) The measles disease is caused by Myxovirus.
b) Its transmission occurs by droplet infection and droplet nuclei, before onset of rash. Portal of entry is respiratory tract.
c) Vaccine is given subcutaneous or intramuscular and it is given after 9-15 months of age.
d) Dose- 0.5 ml
e) It may develop mild or moderate fever about 6-8 days or even may develop red spots.
f) It may be combined with mumps and rubella, varicella vaccines.
7) Rubella Vaccine:
a) These are available as, namely HPV-77 and RA 27/3.
b) Vaccine is often combined with live measles and mumps vaccine.
c) Adverse reactions to rubella vaccine. Include lymphadenopathy, arthralgia and skin rash, pregnancy and immunosupression are contraindications.
d) It is given single dose of 0.5 ml subcutaneously at 9-15 months with measles.
e) The recommended minimum age is 12 to 15 months.
8) Mumps Vaccine:
a) Mumps vaccine or MMR may be given after 12-15 months of age. Since orchitis and oopharitis are occasional complications of mumps in adults, some experts recommended mumps vaccine to all young adults.
b) Dose- 0.5 ml, intramuscularly.
c) Disease spread by droplet infection after direct contact with infected person.
9) Typhoid Vaccine:
a) Presently it is not included in national immunization program.
b) 3 Types of Vaccines are presents:
i) Heat killed, phenol preserved whole cell salmonella Typhi vaccine.
ii) Purified and adjuvenated vi polysaccharide vaccine.
iii) Live attenuated oral Ty 21 a typhoid vaccine.
c) Dosage:
i) Vi- polysaccharide- 25mg.
ii) Dose of 0.5 ml for children more than 10 years of age and 0.25 ml for younger kids.
iii) And in endemic areas booster may be given every 3 years intradermally dose of 0.1 ml.
10) Cholera Vaccine:
a) It is acute diarrheal disease caused by V. cholera 01.
b) There are 3 Types-
i) Oral inactivated vaccine- protective efficacy is 80-85 % for 6 months.
ii) CVD 103 HgR vaccine- given greater than 2 years of age. Single dose confers 95 & 65 % protection against disease.
iii) In the 3rd approach- introduced into Ty 21 a typhoid vaccine strain.
iv) It is given at 2 years of age.

11) Rabies Vaccine:

a) Transmission of rabies virus is through bite of infected animal.
b) As, incubation period is relatively linger, post exposure prophylaxis is possible.
c) Two type of vaccines are currently available in India. One derived from rabies virus grown in human diploid cells and other derived from virus grown in chick embryo cells.
d) The dose is 20 IU/kg is given on day 0.
e) The schedule is 1 ml of vaccine IM or SC or 0.1 ml intradermally on days 0, 28 and 56 or on 0, 7, 28 days. [1,2]

F. Importance of Immunization

1) Immunization protects the children's and adults against the specific disease.
2) The major advantage of live vaccine is that single dose is sufficient for immunization whereas killed vaccines required multiple doses, including periodic booster for prolonged protection against disease.
3) Vaccine induces the permanent immunity.
4) If immunization status of a child is unknown, there is no harm in giving appropriate vaccines again.
5) There is no need of giving all the three doses of primary vaccination schedule.
6) An inactivated and live virus can be administrated simultaneously at different site without interference with immune response.
7) Two or more killed antigens may also be given simultaneously or at any interval between the doses. [1,2]

G. Contraindications to Vaccine

Vaccines are very rarely contraindicated. However it is important to check for contraindications to avoid serious reactions. For examples, vaccines are contraindicated if there is serious allergy to the vaccine or its components. Live vaccine should not be given to immune deficient children.[1,2]

Sr. No	Vaccine	Contraindications
1	All	An anaphylactic reaction, following a previous dose of particular vaccine is a true contraindication to further immunization with antigen concerned and subsequent dose should not be given or current serious illness.
2	Live vaccine (MMR, BCG, Yellow Fever)	Pregnancy. Radiation therapy- (i.e. total body radiation)
3	Yellow Fever	Egg allergy. Immunodeficiency (from medication)
4	BCG	Symptomatic HIV infection
5	Influenza, Yellow Fever	History of anaphylactic reactions following egg ingestion. No vaccine prepared in hens egg tissues should not give.
6	Pertussis containing	Anaphylactic reaction to previous dose. Neurological disease.

Table.2- Contraindications to vaccine

IV. CONCLUSION

A. Immunization is important for prevention of a certain diseases, so government have started the national immunization program. So for this, we should take the vaccines on regular intervals.
B. Immunization induces the strong immunity.
C. The vaccines should be taken on regular intervals and in definite doses.
D. Immunization prevents the diseases like polio, measles, mumps, rubella, tetanus, typhoid, hepatitis, diphtheria, cholera, rabies etc.
E. Vaccination prevents the above diseases and reduces the mortality rate of specific disease.
F. There are only some rare contraindications of vaccines. In such cases vaccines should be avoided.

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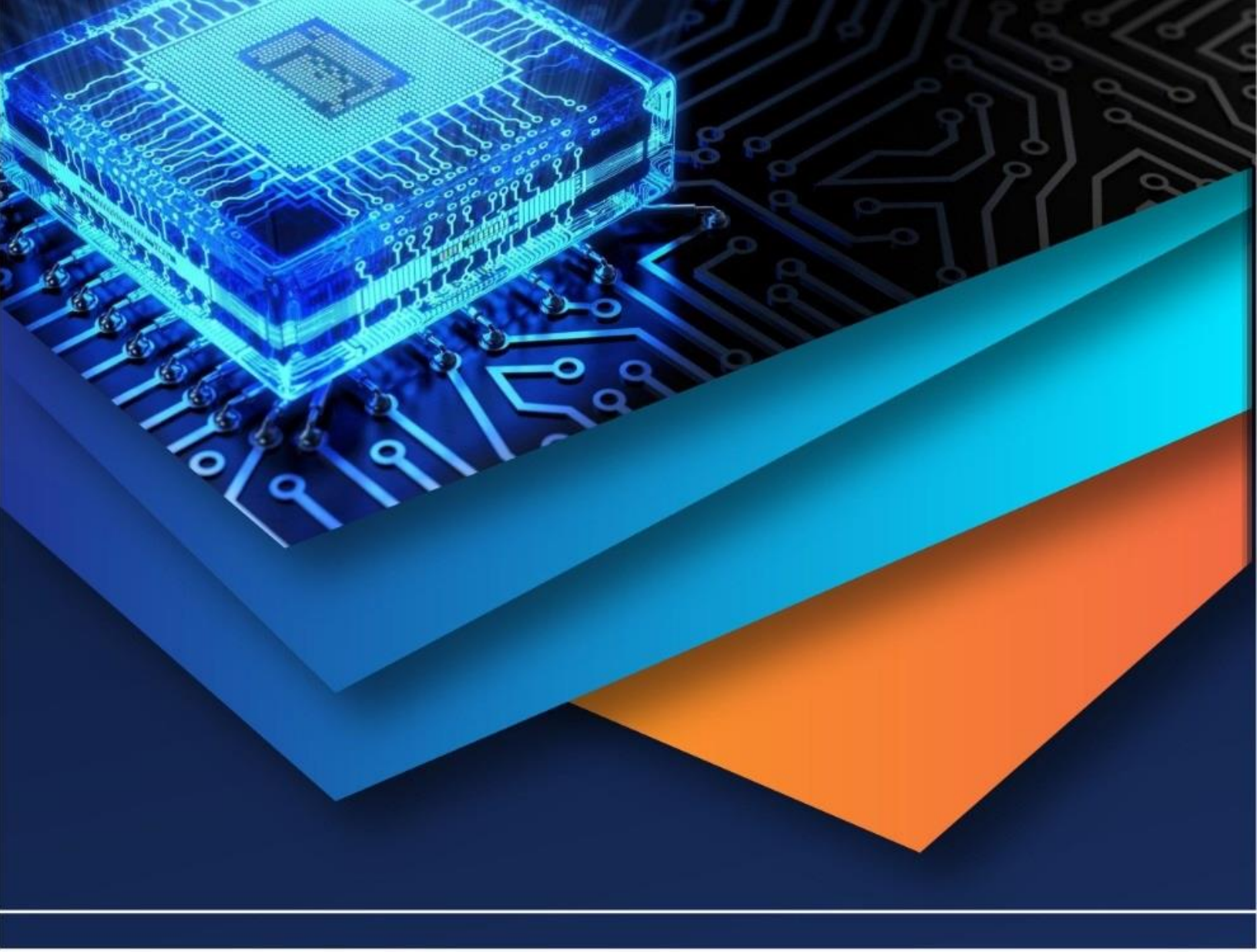

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