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Present day development in the epidemiology and prevention of viral hepatitis.

Introduction:—

The term viral hepatitis includes the diseases– infectious hepatitis and serum hepatitis, two closely related conditions, which are clinically similar but differ in some important respects, e. g. mode of spread, incubation period, age specificity, etc.

Viral hepatitis is common in all parts of the world. In typical case there is a preicteric and an icteric stage, but anicteric cases are very common, specially in children. Symptomless infections are also very common. The characteristic symptoms are nausea vomiting, anorexia, abdominal distress liver enlargement and jaundice. Duration of illness is 2–8 weeks or longer. Laboratory diagnosis depends on biochemical tests which cannot distinguish between two types of the diseases.

History:—

Beginning with the later part of 18th century reports appeared from time to time of epidemics of a mild febrile illness characterised by Jaundice, occuring in scattered localities, in towns, institutions, villages, cities and sometimes spread more widely. It was common in these union troups in the American civil war. During World war I it prevailed from Belgium to Gallipoli, affecting troups in both sides. Similarly, in world war II, it was highly prevalent amongst British French forces in the Mediterranean area (1946). A few years back it was noted as an epidemic in Korea also. Epidemics of the disease have been observed in different parts of India of which Delhi epidemic of 1955-56, Epidemic in ring Nepal of 1960 are worth mentioning

Pioneers in identifying this disease as a clinical entily include, Alurman (1885), Quincke (1903), Cockayne (1912), Blumer (1933), Rich (1930),

Voegf (1942) Maccallum and Bradley (1944), Havens (1945) Neefe (194 Henle and Drake (1950), Litienfele (1953).

Causative Agent:-

Little was known of the causative agent of infective hepatitis befo world war II. A series of experiments carried out on human voluntee during world war II established the viral actiology. The disease was trans mitted to human volunteers by feeding them the duodenal contents from patient with the malady; by parenteral injection of Serum and whole blood and by feeding faecal material obtained from the patients. Inspite of diligen research by many investigators, no animals have been found to be susceptibl to this virus. Knowledge of its characteristics is accordingly limited.

It has been recognised that infectious hepatitis differs from serum hepatitis, in that, it is caused by different virus. Pollard and Oiserious have shown that virus of both infectious hepatitis (virus A or IH) and serum hepatitis (virus **B** or S. H.) have been propagated on embryonated eggs and they have shown that **2** viruses are immunologically distinct that; virus A is homotypic and that, gamma— globulin, can neutralise virus A but not virus B. Virus A can be passaged in faeces and urine and is probably water bourne. It can withstand heating for 56°C for 30 min. Or freezing 10°—20°from 1—1½ year. Virus **B** is found in blood plasma or serum. It survives heating to 60°C for 1 hour and remains active at a temperature of 10° to 20°C for ½ years.

According to recent informations some **18** viruses or groups of related viruses are reported to be related to human hepatitis.

Period of communicability:-

In infective hepatitis, the blood serum and stool remain infective for the same period. It starts 3 weeks before outset of jaundice and lasts usually about a week after jaundice except in chronic cases where it may last, even more than a year.

In serum hepatitis transmission may take place from about 3 months before appearance of jaundice to about a week after appearance of jaundice.

Transmission takes place through parenteral routes and cases are observed after blood transfusion.

Incubation period:-

Incubation period of infective hepatitis has been found to be 15-50 days and that of serum hepatitis is 50–160 days. Wide variations in the incubation period encountered by different workers hints at the existence of multiple strains of virus varying of in vonilence.

Duration of illness:-

It is usually 2—8 weeks.

Host factors:-

Age— Infective hepatitis is mostly found in children and adolescents. Thereis no particular group for serum hepatitis.

Sex— There appears to be little difference by sex in the incidence of infective hepatitis in any age group. The female, during the reproductive period, and particularly during 3rd trimester of pregnancy appears to be more susceptible.

Race— World war II provided unique opportunity for the study of the racial susceptibility. Young active mostly of European stalk were affected most during world war II.

Personal hygiene – Since the Virus has been demonstrated in the faeces of infected individual, there is some association of the disease with unsanit ry living condition.

Other factors:-

Natural resistance may play some role for determining whether the man will be infected or not.

Acquired immunity plays a demonstrable role specially against the homologous agent, mostly even life long.

Second attacks of infectious hepatitis have been observed in 5% cases.

Epidemics of both serum and infectious hepatitis are associated with

common vehicle of infection in which large population are expos to some degree of infection.

Environmental Factors:-

In temporate zone infectious hepatitis appears more prevalent in t autumn and the winter, but summer epidemics also occur. In tropical zo the disease may occur in any time of the year particularly during monsoo because there is every possibility of source of wat r like river b.ing contam inated by surface washir gs.

In the case of serum hepatitis, there is a good reason to believe tha the incidence rate is actually increasing at present in areas where blood an blood products are used and various types of ino culation and parenter therapy are given.

Social & biolog'cal factors

The disease, infective hepatitis, is prevalent in lower socio-economi status. The areas are usually overcrowded with poor sanitation. Inadequat personal hygiene is also an important factor for the spread of the disease.

Mode of transm'ssion

a) Infectious hepatitis— There is almost unanimous agreement that infectious hepatitis spre ad by same mode of person to person contact and epidemic moves at a leisurely pace through a population, usually taking several month to run its course. In outbreaks in civil communities there is marked tendencies towards familial aggregation the risk of contracting hepatitis for members of household of a primary case is as great or greater than a similar risk in scarlet fever, diphtheria or bacillary dysentry. Approximately two-third of the patients report association with a recognised case, either at home or at School. The personal contact was the principle mode of spread in military organisation, was the conclusion drawn by Gauld from his epidmiological field studies of infectious hepatitis. Infectious hepatitis spreads usually by faecal oral route, since the virus, has been demonstrated in the faeces of the infected individuals and there is some apparent association of the disease with unsanitary living condition. There is no evidence to support the concept that the infection is carried by an arthropod vector, although it is possible

that at times, flies, cockroaches, etc, may play a mechanical role in contaminating food.

The possibility of transmission through respiratory route is yet to be proved. The role of urine for the transmission of the disease is still to be established. Attempts to demonstrate the virus in urine and nasopharyngeal washings of patients were unsuceessful.

Occasionally, explosive outbreaks occur due to dissemination by a common medium e. g. water, milk, food (raw snellfish, custard, sandwiches, orange juice, salad, cooked meat, etc.).

Finally, the virus may be transferred artificially from an infected to a susceptible individual by transfusion of blood or blood products, e. g. by the use of improperly sterilised syringes and needles.

b) Serum hepatitis— The agent of this disease is present in the blood serum of an unknown but a variable proportion of individual who are apparently healthy and who present themselves as donor. There is no practical laboratory test available by which these individuals can be identified nor can they be excluded by the absence of history of previous suspicious illness.

Transmission of serum hepatitis takes place only through parenteral routes e. g. (i) during transfusion of blood and blood products like plasma, serum, fibrinogen, globlin and thrombin (ii) through contaminated instruments like needless, syringes, etc. (iii during accidental cuts and scratches specially in nursing and medical staff, laboratory personnel, etc. This mode of parenteral transmisson occurs also in infectious hepatitis, described before Faeces, urine and nasopharyngeal washings of a patient suffering from serum hepatitis are not infective. Transplacental transmission requires confirmation.

Conditions of transmission—

A. In the environment

1) Reservoir of infection— Both infectious hepatitis and serum hepatitis are the diseases of man. In case of infectious hepatitis virus is excreted with stool by patients and carriers. Virus is also found in the blood stream of

infectious hepatitis patients.

In case of serum hepatitis virus is only found in blood stream of pa nts. Evidence of permanent carriers is not clear, but the virus may present in the blood for many months or even 2-3 yrs. after infection.

11) Escape from the reservoir- In case of infectious hepatitis natu portal of escape is through faeces. The virus is also present in blood strea during the preicteric and acute stages and escapes from the body wh blood is withdrawn.

There is no natural portal of escape of the SH virus from the bod Escape in all cases through blood drawn directly from circulaion.

111) Transmission; vehicle of infection- Faecal-oral spread is probab the most common for IH virus vehicles of infection are usually water, food milk, etc. Other process of transmission is through inadequately sterilise syringes. Trasmission through respiratory tract etc. is not yet proved.

Transmission of SH virus is through transfusion of blood and blood products or by contaminated instruments like syrige, needle, etc. Extremel minute doses of blood (as small as 0.0004 ml) appear to be adequate fo transmission of the infection.

B. In the host

1) Entry:— Entryof IH virus is through the mouth in most cases. In cas of transmission through transfusion or syringes the virus is injected through skin into blood stream or subcutaneous tissue. SH virus enters only through the injections into the blood stream or tissues.

11) Susceptibility is high unless there is acquired resistance due to previous infections. Prior infection of either of the diseases infectius hepatitis and serum hepatitis does not confirm resistance against other.

Results of Spread

Both viruses produce liver damages in man, and the liver cells are attacked to a varying degree. The result of this damage, and the subsequent inflammatory reaction controls the morbidity or mortality of the condition. The very mild infection without jaundice can be recognised only if searched

for with the aid of liver function tests. The very low fatality in most outbreaks is a striking feature. The mortality rates of males over 50 years of age are in excess of those of females. The mortality rates were found higher in the community showing evidences of greater malnutrition. When patients of any age are previously debilitated by illness or wounds, the mortality increases sharphy.

Fatality

The case fatality rate of infectious hepatitis is less than 1%, but some of them who recover have permanent liver damage. The rate in serum hepatitis is variable ranging from less than 1% to as high as 20% in some outbreaks.

Prevalence

On account of the mildness of the disease the frequency of sub-clinical or in apparent infections and because routine reporting to health authorities is not required, the disease is much more widely prevalent than as appreciated. The fact that infectious hepatitis is principally a disease of children and adolescents argues for the interpretation that most individuals have acquired immunity by infection before they reach adult life. In the larger urban communities it is probably more or less constantly prevalent on an endemic level. When the virus has been absent from a community for long periods of time and a susceptible population has accumulated [the disease is introduced by an infected individual] [it may spread widely causing an epidemic] if this perhaps explains why epidemics are more frequent in isolated towns and institutions.

Explosive outbreaks of serum hepatitis have been found to occur following the innoculation of American troops in world war II for immunisation againts yellow fever.

Immunity:-

Patients who have an attack of infectious hepatitis in the child hood, it has generally been concluded from epidemiological studies that, about 3 to 5% may have a second attack of infectious hepatitis with jaundice as

adults. The high rate of immunity is presummably due to presence adequate antibody. Thus the gamma- globulin fraction prepared fr pooled adult serum contains antibodies to the virus and can be used protector attunate the infection with virus A.

Acquired immunity plays a demonstrable role also against homologo agent, mostly even life long. But gamma globulen has not been found be helpful in serum hepatitis.

Cross immunity tests, as also clinical observation shows, that Viru B causing serum hepatitis is immunologically distinct from virus A causi infectious hepatitis. (Antibody against one does not give protection agai other). patients who have infectious hepatitis are susceptible to seru hepatitis and vice versa.

The results of a few investigation carried out in India are as follows:-

2) Outbreak of IJ in IIT Kharagur West Bengal.

An epidemic of infectious hepatitis took place during a period of Jul to October 1960 in the campus of Engineering College Kharagpur. Tota population including hostel and family quarters was 5800 and the numbe of cases was 61 with no death.

The epidemic pattern and its explosiveness suggested that the epidemic was probably water borne and the contamination of the drinking wate supply of the campus with the virus of hepatitis had probably taken place, a fortnight or so before its onset.

The epidemiological study eliminated the probability of the passage of virus through innoculations.

The investigation showed that during the past few years sporadic cases of Jaundice had appeared within the campus from time to time.

The attack rate in hostel and family quarters were 1.6 and 0.8 respectively.

The attack rates of different series were not statistically significant.

In the affected household, the children below 10 years of age and those going to school, in particular in college hostel, the new commer junior students suffered the most. The susceptibility to jaundice amongst the latter was found to have been influenced by the lenght of the stay of the individual within the college. In this respect the majority of those students who got the attack had been in residence there for a period not exceeding 2 years.

The result of the bacteriological examination of the water sample was enough to show that the drinking water supply of the campus obtained from the open well sources had probably been the vehicle responsible for the epidemic. The contamination of those wells could have been taken place as a result of the heavy rains which occurred in July and August.

3 Outbreak of I.' H. in Kalabadevi in Bombay during March, 1959

The sudden occurrence of a large number of infectious hepatitis cases in Gokuldas Tijpal High School, in Kalbadevi was reported in March 1959.

Out of total population of the school 2,080 including teachers, students and peons 139 were affected. On investigation it was found out that other part at the city also was affected.

Two peaks at epedemic had occurred.

i) one during lst. and 2nd. weeks of march &
ii) the other during 4th week of March.

The cases were diagnosed as cases of infectious hepatitis from the characteristic jaundice.

Roughly 5½-6% of the population were suffered from this disease. Total 15,000.

Age destribution- Higher incidence among children & young adult were recorded but highest attack. Rate were found in the group of adults 25-30 years at age.

Male were mostly affected than female.

Bacteriological examination had revealed that 40 of the 100 samples

collected and examined showed B. type I. Here also the destribution of wat was from the direct main which was found leaking close to the School.

It has been stated in literature that roughly there are 2-8 in apparen cases for every clinically diagnosed case of infectious hepatitiis. So it i very likely that most of the adult population would be immune and onl the younger generation e. g. in front and children would be mostly susceptibl But the high proportion at cases adults is probably due to a heavy dose o infections.

4] Infective Hepatitis in Aurangabad in 1961

An out break of infectious hepatitis had occured in Aurangabad jus after few weeks of following the flood at that area.

Total population— 97,636
cases occured – 173

Age destribution— Through there were cases among children & young adults, in maximum cases had occured in the age group 21—25 years.

In the simple survey of 1882 persons the destribution of cases according to sex was as thus.

Male=
Female = 15

water supply of the affected area.

i) one source— filtered & chlorinated.
ii) Other sources— only chlorinated.

There were many surface drains and the pipes conducting drinkin water cross the open drains. Bacteriological investigation showened coliform organisms which suggested the leaks in the destributory system an resulted this situation.

Prevention of viral hepatitis:-

a) Infectious hepatitis:- there is little that can be done to prevent o postpone exposure of virus of infectious hepatitis except by general measure of personal cleaniless, home nygiene and community situation.

Quarantine of contacts and isolation of patients are not very effective as patient excretes virus as early 2 weeks before appearance of jaundice in icteric patients and similar period in anicteric patients. Anyway, recognised clinical cases should be isolated for week following onset, with appropriate attention to safe faecal disposal; soiled clothings are to be autoclaved or boiled.

Contamination of food, water, milk, etc. is to be avoided. Chlorination has got very little effect on contamination of water supply.

Food handlers should be advised as regards personal hygiene.

Accidental trasmission may be avoided by proper sterilisation of needless, syringes, etc.

Human gamma—globulin confers temporary passive protection:— 0.02 ml. 0.04 of a 16'/. concentration per kg. of body wt. is effective in prevention. 0.06-0.12 ml/k. g. I M. gives 5-6 months protection. It is recommeded for exposed persons who because of their general condition are poor risks for any Infectious disease, and it may be used effectively to check an institutional epidemic.

No effective vaccine for active immunisation is known.

a) Serum hepatitis:-

The prevention of serum hepatitis follows largely from what is known about its mode of transmission. Efforts to exclude the risk of transfering the icterogenic agent in transfusion by examination of blood donors is not reliable. Individuals may have the virus in their circulating blood without having recognisable signs and symptoms. Nevertheless the following procedures will help a lot in preventing the disease:-

Proper sterilisation of instruments:- needle, syringe, lancets, transfusion sets; etc. before use must be done.

Unnecessary transfusion of blood or blood products should be avoided.

Proper selection of donor - Those giving history of jaundice are avoided. Those getting transfusion within last 6 months or giving history of contact with hepatitis during last 6 months are not recommneded as donor.

If their blood is suspected of having been responsible for a case of p transfusion hepatitis they cannot be recommended as donors.

Plasma transufsion is avoided if the substitute is available. Storage liquid plasma at a temperature of 27°C - 31.6°C for 6 months may redu the risk pf transmitting hepatitis. The results of using B - propiolattone conjunction with ultraviolet light are encouraging.

Maintenance of accurate records of origin, distribution and administra tion of blood and blood proudcts will help control of hepatitis.

Gamma - globulin is not very helpful. More study is necessary.

Isolation of cases and quarantine of contacts are not necessary.

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