B. Jain
Preventive & Social Medicine

Leseprobe

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von B. Jain
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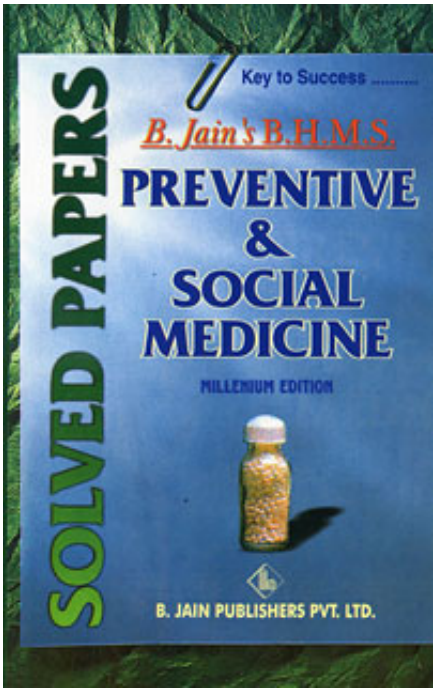

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PARTB

Q.4 How can water be purified for drinking purposes? Describe the methods that can be used at small scale. (6)

Ans. Water can be purified for drinking purposes by:—

1. Storage.
2. Filtration.
3. Chlorination.

1. Storage: Water is drawn out from the source and impounded in natural or artificial reservoirs. Storage provides a reserve of water from which further pollution is excluded. As a result of storage, a very considerable amount of purification takes place by:—

(a) *Physical process:* 90% impurities settle down due to gravity. The water becomes clearer.

(b) *Chemical:* The aerobic bacteria oxidize the organic matter present in the water with the aid of dissolved oxygen.

(c) *Biological:* A tremendous drop takes place in bacterial count during storage.

2. Filtration: It is the second stage in the purification of water and quite an important stage because 98-99% of bacteria are removed by filtration.

3. Chlorination: It is one of the greatest advances in water purification. It is a supplement and not a substitute to sand filteration. Chlorine kills pathogenic bacteria but it has no effect on spores and certain viruses (e.g., polio, viral hepatitis).

Principles of chlorination:—

1. First of all, the water to be chlorinated should be clear and free from turbidity. Turbidity impedes efficient chlorination.
2. Secondly, the "chlorine demand" of water is to be estimated. The chlorine demand of water is the difference between the amount of chlorine added to the water and the amount of residual chlorine remaining at the end of a specific period of contact (usually 60 minutes) at a given temperature and pH of the water. The point at which the chlorine demand of water is met is called the "break point".
3. Contact period should be at least one hour.

The minimum recommended concentration of free chlorine is 0.5 mg/1 for one hour.

Purification of water on a small scale:—

1. *Household purification of water:—*

Three methods are generally available for purifying water on a small scale. These methods can be used singly or in combination.

(a) Boiling: Boiling is a satisfactory method of purifying water for household purposes. To be effective the water must be brought to a "rolling boil" for 5 to 10 minutes. It kills all bacteria, spores, cysts and ova and yields sterilized water. Boiling also removes temporary hardness by driving off $CO_2$and precipitating the calcium carbonate. Taste of water is altered. While boiling is an excellent method of purification, it offers no "residual protection" against subsequent microbial contamination. Water should be boiled in the same container in which it is to be stored to avoid contamination during storage.

(b) Clinical disinfections:—

(i) Bleaching powder: It is a white amorphous powder with a pungent smell of chlorine when freshly made. It contains 33% "available chlorine". It is however an unstable compound.

On exposure to light, air it looses its chlorine content. But when mixed with excess of lime, it retains its strength, this is called "stabilized lime."

(ii) Chlorine solution: May be prepared from bleaching powder. If 4 kgs of bleaching powder with 25% available chlorine is mixed with 20 litres of water it will give 5% solution of chlorine.

(iii)High test hypochlorite: These are calcium compounds which contains 60-70% available chlorine. It is more stable than bleaching powder and deteriorates much less on storage.

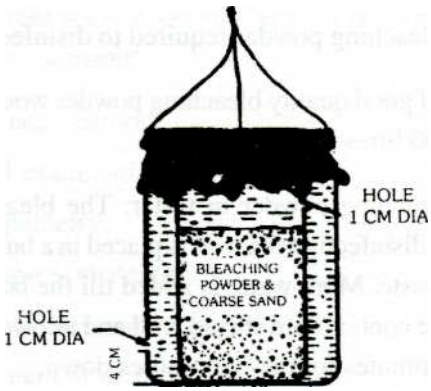
(iv) Chlorine tablets: These are available in the market under various trade-names (viz. halozone tablets). They are quite good for disinfecting small quantities of water.

(v) Iodine: Two drops of *2%* ethanol solution of iodine will suffice for one litre of clear water. A contact time of 20 to 30 minutes is needed for effective disinfections.

(vi) Potassium permanganate: Although a powerful oxidizing agent, it is not a satisfactory agent for disinfecting water. It may kill cholera vibrios, but is of little use against other disease organisms. It alters the color, smell and taste of water.

(c) Filteration:—

Water can be purified on a small scale by filtering through ceramic filters such as Pasteur Chamberland filter, Berkefeld filter



and Katadyn filter. The essential part of filter is the "candle" which is made of porcelain in the Chamberland type and of kieselgurh in the Berkefeld filter.

2. *Disinfection of wells:—*

The most effective and cheapest method of disinfecting wells is by bleaching powder.

Steps in well disinfection:—

(i) Find the volume of water in the well.

(a) Measure the depth of water column ------ (h) meter

(b) Measure the diameter of well ------ (d) metres

(c) Substitute h and d in

$$V = \frac{3.14 \times d^2 \times h}{4} \times 100$$

(d) One cubic metre = 'lOOO litres of water.

(ii) Find the amount of bleaching powder required for disinfection.

Estimate the chlorine demand of the well water and calculate the amount of bleaching powder required to disinfect the well.

2.5 grams of good quality bleaching powder would be required to disinfect 1,000 litres of water.

(iii) Dissolve bleaching powder in water: The bleaching powder required for disinfecting the well is placed in a bucket and made into a thin paste. More water is added till the bucket is nearly %th full. The contents are stirred well and allowed to sediment for 5 to 10 minutes for the lime settles down.

(iv) Delivery of chlorine solution into the well. The bucket containing the chlorine solution is lowered some distance below the water surface and the well water is agitated by moving the bucket violently both vertically and laterally.

(v) Contact period should be 1 hour,

(vi) Ortho-tolicline Arsenite Test.

It is a good practice to test for residual chlorine at the end of one hour contact. If the free chlorine level is less than 0.5 mg/litre, the chlorination procedure should be repeated.

Q.5 Define growth and development. How will you assess **the growth and development of children below 5 years of age.**

Ans. Growth refers to an increase in the physical size of the body.

Development refers to an increase in skill and function. Growth and development are considered together because the child grows and develops as a whole.

In nutritional surveys, the examination of a random and

rcpresentive sample of the population covering all ages and both sex in different socio-economic groups is sufficient to be able to draw valid conclusions.

Assessment methods:—

1. Clinical examination.
2. Anthropometry.
3. Biochemical evaluation.
4. Functional assessment.
5. Assessment of dietary intake.
6. Vital and health statistics.
7. Ecological studies.

1. *Clinical examination:* It is an essential feature of all nutritional survey:; since their ultimate objective is to assess levels of health of individuals or of population groups in relation to food they consume. There are a number of physical signs, some specific and many non-specific, known to be associated with states of malnutrition. However clinical signs have the following drawbacks:—

(a) Malnutrition cannot be quantified on the basis of clinical signs.

(b) Many deficiencies are unaccompanied by physical signs.

(c) Lack of specificity and subjective nature of most of the physical signs.

2. *Anthropometry:* Anthropometric measurements such as height, weight, skin fold thickness and arm circumference are valuable indications of nutritional status. If anthropometric measurements are recorded over a period of time, they reflect the

patterns of growth and development and how individuals deviate from the average at various ages in body size, build and nutritional status.

3. *Biochemical assessment:—*

(a) Laboratory tests:—

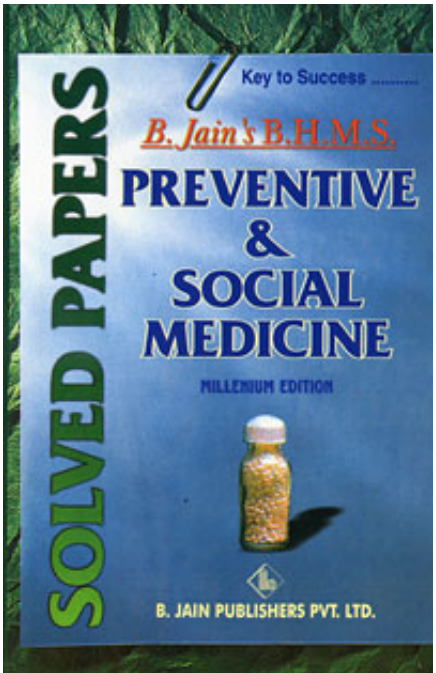
(i) Hb estimation: It is an important laboratory test that is carried out in nutritional surveys.

(ii) Stool and urine: Stool should be examined for intestinal parasites. Urine should examined for albumin and sugar.

(b) Biochemical tests: With increasing knowledge of the metabolic functions of vitamins and minerals, assessment of nutritional status by clinical signs has given way to more precise biochemical tests.

Some biochemical tests in nutritional surveys are:—

Nutrient	Method	Normal value
Vit.A	Serum retinol	20 mcg/dl
Thiamine	Thiamine pyrophosphate (TPP) stimulation of RBC transketolase activity.	1.00-1.23 (ratio)
Riboflavin	RBC glutathione reductase activity stimulated by FAD	1.0-1.2 (ratio)
Niacin	Urine N-methyl nicotinamide	(not reliable)
	Serum folate	6.0 meg/ml
	Red cell folate	160 meg/ml



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