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# the S Q U A R E

Healthcare bulletin

- ◆ **Chronic Kidney Disease**
- ◆ **Chickenpox**
- ◆ **Food Adulteration in Bangladesh**
- ◆ **Road Traffic Accident**



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### Editorial



Dear Doctor:

Welcome to this edition of "the SQUARE" healthcare bulletin!

In this issue we have published a special feature on "Chronic Kidney Disease (CKD)", a global public health problem with a rising prevalence. Diabetes and hypertension are the main causes of CKD in all high-income and middle-income countries and also in many low-income countries. Incidence, prevalence and progression of CKD also vary within countries by ethnicity and social determinants of health, possibly through epigenetic influence. We have also focused on "Chicken Pox", the disease that has a worldwide distribution and is reported throughout the year in regions of temperate climate. A special write-up on "Food Adulteration in Bangladesh", which has become a major threat for public health, is included in this issue.

Besides, an article on "Road Traffic Accident", one of the main causes of death and disability, with an unequal number of incidences in developing countries, has been published here.

We put our best effort to make this issue interesting and we are quite sure that you will enjoy reading this as well.

We, on behalf of the management of SQUARE wish you all a safe, healthy and peaceful life.

Thank you!

*Omar Akramur Rab*

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**C**hronic kidney disease (CKD), also known as chronic renal failure, defined as evidence of structural or functional renal impairment for 3 or more months, is generally progressive and irreversible, affecting multiple metabolic pathways. CKD is a worldwide public health problem. It is associated with an increased risk of cardiovascular disease and chronic renal failure. Normal growth and development may be hindered, especially in children.

The Kidney Disease Outcomes Quality Initiative (KDOQI) of the National Kidney Foundation (NKF) established a definition and classification of CKD. The KDOQI and the international guideline group Kidney Disease Improving Global Outcomes (KDIGO) have subsequently updated these guidelines.

## Epidemiology

This is a common condition that is often unrecognized until the most advanced stages. It is estimated that 11% of the adult population worldwide has CKD. The incidence is rising and is thought to be due to an aging population; a higher incidence of diseases such as diabetes and hypertension, which are the most common causes in the adult population; and an increased incidence of glomerular disorders such as focal segmental glomerulosclerosis. Black people, Hispanic people and those with a family member who has a diagnosis of kidney disease have a higher prevalence than the general population. Additionally, individuals with an episode of acute kidney injury are most likely to be at risk for chronic kidney injury and end-stage kidney disease in the future.

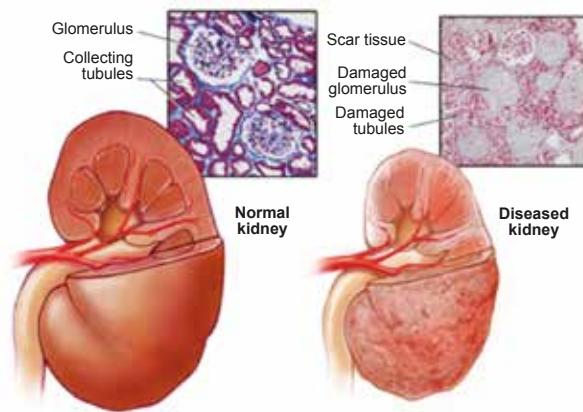
## Pathophysiology

The pathophysiology is complex. Regardless of the method of renal injury (i.e. diabetes, hypertension, or glomerular disorders), once renal damage has occurred, a cascade of events ensues.

- ❑ In response to renal injury, there is thought to be an increase in intraglomerular pressure with glomerular hypertrophy, as the kidney attempts to adapt to nephron loss to maintain constant glomerular filtration.
- ❑ An increase in glomerular permeability to macromolecules such as transforming growth

factor-beta (TGF-beta), fatty acids, proinflammatory markers of oxidant stress and protein may result in toxicity to the mesangial matrix, causing mesangial cell expansion, inflammation, fibrosis and glomerular scarring.

- ❑ Additionally, renal injury results in an increase in angiotensin II production, causing an upregulation of TGF-beta, contributing to collagen synthesis and renal scarring within the glomerulus.
- ❑ Both the structural alterations and accompanying biochemical, cellular and molecular changes seem to account for progressive renal scarring and loss of kidney function.
- ❑ All forms of CKD are also associated with tubulointerstitial disease; the exact mechanism of injury is not known but is thought to be secondary to reduction in blood supply in addition to an infiltration of lymphocytes and inflammatory mediators that result in interstitial fibrosis and tubular atrophy.



## Etiology

Causes of chronic kidney disease (CKD) include the following:

- ❑ Diabetic kidney disease
- ❑ Hypertension
- ❑ Vascular disease
- ❑ Glomerular disease (primary or secondary)
- ❑ Cystic kidney diseases
- ❑ Tubulointerstitial disease
- ❑ Urinary tract obstruction or dysfunction
- ❑ Recurrent kidney stone disease
- ❑ Congenital (birth) defects of the kidney or bladder

- Unrecovered acute kidney injury

Vascular diseases that can cause CKD include the following:

- Renal artery stenosis
- Cytoplasmic pattern antineutrophil cytoplasmic antibody (C-ANCA)-positive and perinuclear pattern antineutrophil cytoplasmic antibody (P-ANCA)-positive vasculitides
- ANCA-negative vasculitides
- Atheroemboli
- Hypertensive nephrosclerosis
- Renal vein thrombosis

Primary glomerular diseases include the following:

- Membranous nephropathy
- Alport syndrome
- Immunoglobulin A (IgA) nephropathy
- Focal and segmental glomerulosclerosis (FSGS)
- Minimal change disease
- Membranoproliferative glomerulonephritis (MPGN)
- Complement-related diseases (eg, atypical hemolytic-uremic syndrome [HUS], dense deposit disease)
- Rapidly progressive (crescentic) glomerulonephritis

Secondary causes of glomerular disease include the following:

- Diabetes mellitus
- Systemic lupus erythematosus
- Rheumatoid arthritis
- Mixed connective tissue disease
- Scleroderma
- Wegener granulomatosis
- Mixed cryoglobulinemia
- Endocarditis
- Hepatitis B and C
- Syphilis
- Human immunodeficiency virus (HIV)
- Parasitic infection
- Heroin use
- Gold
- Penicillamine
- Amyloidosis
- Light-chain deposition disease
- Neoplasia

- Thrombotic thrombocytopenic purpura (TTP)
- Shiga-toxin or Streptococcus pneumoniae-related HUS
- Henoch-Schönlein purpura
- Reflux nephropathy

Causes of tubulointerstitial disease include the following:

- Drugs (eg, sulfonamides, allopurinol)
- Infection (viral, bacterial, parasitic)
- Sjogren syndrome
- Tubulointerstitial nephritis and uveitis (TINU) syndrome
- Chronic hypokalemia
- Chronic hypercalcemia
- Sarcoidosis
- Multiple myeloma cast nephropathy
- Heavy metals
- Radiation nephritis
- Polycystic kidneys
- Cystinosis and other inherited diseases

Urinary tract obstruction may result from any of the following:

- Benign prostatic hypertrophy
- Urolithiasis
- Urethral stricture
- Tumors
- Neurogenic bladder
- Congenital defects of the kidney or bladder
- Retroperitoneal fibrosis

## Staging

The different stages of CKD form a continuum. The stages of CKD are classified as follows:

- Stage 1: Kidney damage with normal or increased GFR ( $>90 \text{ mL/min}/1.73 \text{ m}^2$ )
- Stage 2: Mild reduction in GFR (60-89 mL/min/1.73 m<sup>2</sup>)
- Stage 3a: Moderate reduction in GFR (45-59 mL/min/1.73 m<sup>2</sup>)
- Stage 3b: Moderate reduction in GFR (30-44 mL/min/1.73 m<sup>2</sup>)
- Stage 4: Severe reduction in GFR (15-29 mL/min/1.73 m<sup>2</sup>)
- Stage 5: Kidney failure (GFR  $< 15 \text{ mL/min}/1.73 \text{ m}^2$  or dialysis)

In stage 1 and stage 2 CKD, reduced GFR alone does not clinch the diagnosis, because the GFR may in fact be normal or borderline normal. In such cases, the presence of one or more of the following markers of kidney damage can establish the diagnosis :

- Albuminuria (albumin excretion >30 mg/24 hr or albumin: creatinine ratio >30 mg/g [ $>3 \text{ mg/mmol}$ ])
- Urine sediment abnormalities
- Electrolyte and other abnormalities due to tubular disorders
- Histologic abnormalities
- Structural abnormalities detected by imaging
- History of kidney transplantation in such cases

Hypertension is a frequent sign of CKD but should not by itself be considered a marker of it, because elevated blood pressure is also common among people without CKD.

### **Diagnostic approach**

It is important to note that a significant proportion of people are asymptomatic and the diagnosis relies on pathologic evidence of kidney damage such as hematuria and/or proteinuria or laboratory evidence of a reduction in the glomerular filtration rate (GFR) with an elevated serum creatinine.

### **History**

Patients with chronic kidney disease (CKD) stages 1-3 (glomerular filtration rate [GFR]  $>30 \text{ mL/min}/1.73 \text{ m}^2$ ) are frequently asymptomatic; in terms of possible “negative” symptoms related simply to the reduction in GFR, they do not experience clinically evident disturbances in water or electrolyte balance or endocrine/metabolic derangements.

Generally, these disturbances become clinically manifest with CKD stages 4-5 (GFR  $< 30 \text{ mL/min}/1.73 \text{ m}^2$ ). Patients with tubulointerstitial disease, cystic diseases, nephrotic syndrome and other conditions associated with “positive” symptoms (eg, polyuria, hematuria, edema) are more likely to develop signs of disease at earlier stages.

Uremic manifestations in patients with CKD stage 5 are believed to be primarily secondary to an accumulation of multiple toxins, the full spectrum

and identity of which is generally not known. Metabolic acidosis in stage 5 may manifest as protein-energy malnutrition, loss of lean body mass and muscle weakness. Altered salt and water handling by the kidney in CKD can cause peripheral edema and not uncommonly, pulmonary edema and hypertension. Anemia, which in CKD develops primarily as a result of decreased renal synthesis of erythropoietin.

### **Physical Examination**

A careful physical examination is imperative. It may reveal findings characteristic of the condition that is underlying chronic kidney disease (CKD) (eg, lupus, severe arteriosclerosis, hypertension) or its complications (eg, anemia, bleeding diathesis, pericarditis). However, the lack of findings on physical examination does not exclude kidney disease. In fact, CKD is frequently clinically silent, so screening of patients without signs or symptoms at routine health visits is important.

### **Signs and symptoms**

Patients with CKD stages 1-3 are generally asymptomatic. Typically, it is not until stages 4-5 ( $\text{GFR} < 30 \text{ mL/min}/1.73 \text{ m}^2$ ) that endocrine/ metabolic derangements or disturbances in water or electrolyte balance become clinically manifest.

Signs of metabolic acidosis in stage 5 CKD include the following:

- Protein-energy malnutrition
- Loss of lean body mass
- Muscle weakness

Signs of alterations in the way the kidneys are handling salt and water in stage 5 include the following:

- Peripheral edema
- Pulmonary edema
- Hypertension

Anemia in CKD is associated with the following:

- Fatigue
- Reduced exercise capacity
- Impaired cognitive and immune function
- Reduced quality of life
- Development of cardiovascular disease
- New onset of heart failure or the development of more severe heart failure
- Increased cardiovascular mortality

## Workup

### Approach Considerations

Testing in patients with chronic kidney disease (CKD) typically includes a complete blood count (CBC), basic metabolic panel and urinalysis, with calculation of renal function. Normochromic normocytic anemia is commonly seen in CKD. Other underlying causes of anemia should be ruled out.

The blood urea nitrogen (BUN) and serum creatinine levels will be elevated in patients with CKD. Hyperkalemia or low bicarbonate levels may be present. Serum albumin levels may also be measured, as patients may have hypoalbuminemia as a result of urinary protein loss or malnutrition. A lipid profile should be performed in all patients with CKD because of their risk of cardiovascular disease.

Serum phosphate, 25-hydroxyvitamin D, alkaline phosphatase and intact parathyroid hormone (PTH) levels are obtained to look for evidence of renal bone disease. Renal ultrasonography and other imaging studies may be indicated.

Measurement of serum cystatin-C levels is gaining a greater role in the estimation of kidney function. Cystatin-C is a small protein that is expressed in all nucleated cells, produced at a constant rate and freely filtered by the glomerulus; it is not secreted but is instead reabsorbed by tubular epithelial cells and catabolized, so it does not return to the bloodstream. These properties make it a valuable endogenous marker of renal function. A study that used cystatin C instead of creatinine to estimate glomerular filtration rate (GFR) concluded that cystatin C-based GFR equations outperform creatinine-based formula in obese CKD patients, especially those with a body mass index (BMI)  $\geq 35 \text{ kg/m}^2$  and in obese women.

In certain cases, the following tests may be ordered as part of the evaluation of patients with CKD:

- ❑ Serum and urine protein electrophoresis, serum and urine free light chains: Screen for a monoclonal protein possibly representing multiple myeloma
- ❑ Antinuclear antibodies (ANA), double-stranded DNA antibody levels: Screen for systemic lupus erythematosus

- ❑ Serum complement levels: Results may be depressed with some glomerulonephritides
- ❑ Cytoplasmic and perinuclear pattern antineutrophil cytoplasmic antibody (C-ANCA and P-ANCA) levels: Positive findings are helpful in the diagnosis of granulomatosis with polyangiitis (Wegener granulomatosis); a positive P-ANCA result is also helpful in the diagnosis of microscopic polyangiitis
- ❑ Anti-glomerular basement membrane (anti-GBM) antibodies: Their presence is highly suggestive of underlying Goodpasture syndrome
- ❑ Hepatitis B and C, human immunodeficiency virus (HIV), Venereal Disease Research Laboratory (VDRL) serology: These conditions are associated with some glomerulonephritides
- ❑ Imaging studies and consideration of bladder function studies: These evaluate for possible obstruction and other urologic abnormalities

### Screening

New evidence-based recommendations from the American College of Physicians (ACP) regarding the screening, monitoring and treatment of adults with stage 1-3 CKD recommend against CKD screening for asymptomatic adults with no risk factors for kidney disease. The ACP's position, however, has been disputed by the American Society of Nephrology (ASN).

The ACP recommendations are as follows :

- ❑ Asymptomatic adults without risk factors for CKD should not be screened for the disease (Grade: weak recommendation, low-quality evidence)
- ❑ Adults with or without diabetes who are currently taking an angiotensin-converting enzyme (ACE) inhibitor or an angiotensin II-receptor blocker (ARB) should not be tested for proteinuria (Grade: weak recommendation, low-quality evidence)
- ❑ In treating patients with hypertension and stage 1-3 CKD, clinicians should select pharmacologic therapy that includes either an ACE inhibitor (moderate-quality evidence) or an ARB (high-quality evidence) (Grade: strong recommendation)

- Elevated low-density lipoprotein levels in patients with stage 1-3 CKD should be managed with statin therapy (Grade: strong recommendation, moderate-quality evidence)

The ASN, however, in response to the ACP recommendations, released a statement strongly advocating CKD screening even in patients without risk factors for CKD. The ASN pointed out that early CKD is usually asymptomatic and that catching and treating it early may slow its development.

### **Urinalysis**

In adult patients who are not at elevated risk for CKD, screening with total protein can be done with a standard urine dipstick, according to guidelines from the National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI). If the dipstick test is positive (1+ or greater), patients should undergo testing for confirmation of proteinuria.

Although 24-hour urine collection for total protein and creatinine clearance (CrCl) can be performed, spot urine collection for total protein-to-creatinine (P/C) ratio allows reliable approximation (extrapolation) of total 24-hour urinary protein excretion. In children, teenagers and young adults in particular, a first morning urine specimen is preferable to a random specimen, as so-called orthostatic proteinuria (considered benign) can be excluded.

For screening patients at elevated risk, the KDOQI recommends using an albumin-specific dipstick; this is because albuminuria is a more sensitive marker than total protein for CKD from diabetes, hypertension and glomerular disease.

For monitoring proteinuria in adults with CKD, the KDOQI recommends measuring the P/C ratio in spot urine samples, using the albumin-to-creatinine ratio.

Dipstick proteinuria may suggest a glomerular or tubulointerstitial problem. The urine sediment finding of red blood cells (RBCs) and RBC casts suggests proliferative glomerulonephritis. Pyuria and/or white blood cell casts suggest interstitial nephritis (particularly if eosinophiluria is present) or urinary tract infection.

### **Renal Ultrasonography**

Renal ultrasonography is useful to screen for hydronephrosis, which may not be observed in early

obstruction, or involvement of the retroperitoneum with fibrosis, tumor or diffuse adenopathy. Small, echogenic kidneys are observed in advanced renal failure.

In contrast, kidneys usually are normal in size in advanced diabetic nephropathy, in which affected kidneys are initially enlarged from hyperfiltration. Structural abnormalities, such as those indicative of polycystic kidneys, also may be observed on ultrasonograms. Renal ultrasonography is the initial imaging modality of choice for children.

### **Radiography**

A retrograde pyelogram may be indicated if a high index of clinical suspicion for obstruction exists despite a negative finding on renal ultrasonography. Intravenous pyelography is not commonly performed, because of the potential for renal toxicity from the intravenous contrast; however, this procedure is often used to diagnose renal stones. Plain abdominal radiography is particularly useful to look for radio-opaque stones or nephrocalcinosis, while a voiding cystourethrogram (VCUG) is the criterion standard for diagnosis of vesicoureteral reflux.

### **CT, MRI and Radionuclide Scans**

Computed tomography (CT) scanning can better define renal masses and cysts usually noted on ultrasonography. Also, CT scanning is the most sensitive test for identifying renal stones. Intravenous (IV) contrast-enhanced CT scans should be avoided in patients with renal impairment to avoid acute renal failure; this risk significantly increases in patients with moderate to severe CKD. Dehydration also markedly increases this risk.

Magnetic resonance imaging (MRI) is very useful in patients who would otherwise undergo a CT scan but who cannot receive IV contrast. This imaging modality is reliable in the diagnosis of renal vein thrombosis, as are CT scanning and renal venography.

Magnetic resonance angiography (MRA) is becoming more useful for the diagnosis of renal artery stenosis, although renal arteriography remains the criterion standard. However, MRI contrast is problematic in patients with existing chronic kidney disease (CKD) because they have a low, but potentially fatal,

risk of developing nephrogenic systemic fibrosis. A renal radionuclide scan can be used to screen for renal artery stenosis when performed with captopril administration; it also quantitates differential renal contribution to total glomerular filtration rate (GFR). However, radionuclide scans are unreliable in patients with a GFR of less than 30 mL/min/1.73 m<sup>2</sup>.

## Renal Biopsy

Percutaneous renal biopsy is performed most often with ultrasonographic guidance and the use of a spring-loaded or other semi-automated needle. This procedure is generally indicated when renal impairment and/or proteinuria approaching the nephrotic range are present and the diagnosis is unclear after an appropriate workup.

Biopsies are also indicated to guide management in already-diagnosed conditions, such as lupus, in which the prognosis is highly dependent on the degree of kidney involvement. Biopsy is not usually indicated when renal ultrasonography reveals small, echogenic kidneys on ultrasonography, because this finding represents severe scarring and chronic, irreversible injury.

The most common complication of this procedure is bleeding, which can be life-threatening in a minority of cases. Surgical open renal biopsy can be considered when the risk of renal bleeding is felt to be great, occasionally with solitary kidneys or when percutaneous biopsy is technically difficult to perform.

Renal histology in CKD reveals findings compatible with the underlying primary renal diagnosis. In some cases, a biopsy may show nonspecific changes, with the exact diagnosis remaining in doubt.

## Management

Early diagnosis and treatment of the underlying cause and/or institution of secondary preventive measures is imperative in patients with CKD. These may slow or possibly halt, progression of the disease. The medical care of patients with CKD should focus on the following:

- ❑ Delaying or halting the progression of CKD: Treatment of the underlying condition, if possible, is indicated
- ❑ Diagnosing and treating the pathologic manifestations of CKD

- ❑ Timely planning for long-term renal replacement therapy

Pathologic manifestations of chronic kidney disease (CKD) should be treated as follows:

- ❑ Anemia: When the hemoglobin level is below 10 g/dL, to be treated with an erythropoiesis-stimulating agent (ESA) such as epoetin alfa or darbepoetin alfa (previously, peginesatide was also considered an option for anemia in CKD, but this agent was withdrawn from the market due to serious hypersensitivity reactions); caution should be exercised in patients with malignancy
- ❑ Hyperphosphatemia: To be treated with dietary phosphate binders and dietary phosphate restriction
- ❑ Hypocalcemia: This condition to be treated with calcium supplements with or without calcitriol
- ❑ Hyperparathyroidism: To be treated with calcitriol, vitamin D analogues, or calcimimetics
- ❑ Volume overload: To be treated with loop diuretics or ultrafiltration
- ❑ Metabolic acidosis: To be treated with oral alkali supplementation
- ❑ Uremic manifestations: To be treated with long-term renal replacement therapy (hemodialysis, peritoneal dialysis or renal transplantation)
- ❑ Cardiovascular complications: To be treated as appropriate
- ❑ Growth failure in children: To be treated with growth hormone

Indications for renal replacement therapy include the following:

- ❑ Severe metabolic acidosis
- ❑ Hyperkalemia
- ❑ Pericarditis
- ❑ Encephalopathy
- ❑ Intractable volume overload
- ❑ Failure to thrive and malnutrition
- ❑ Peripheral neuropathy
- ❑ Intractable gastrointestinal symptoms
- ❑ In asymptomatic patients, a GFR of 5-9 mL/min/1.73 m<sup>2</sup>, irrespective of the cause of the CKD or the presence or absence of other comorbidities

## Delaying or Halting Progression of Chronic Kidney Disease

Measures indicated to delay or halt the progression of chronic kidney disease (CKD) are as follows:

- ❑ Treatment of the underlying condition if possible
- ❑ Aggressive blood pressure control to target values per current guidelines
- ❑ Treatment of hyperlipidemia to target levels per current guidelines
- ❑ Aggressive glycemic control per the American Diabetes Association (ADA) recommendations (target hemoglobin A1c [HbA1C] < 7%)
- ❑ Avoidance of nephrotoxins, including intravenous (IV) radiocontrast media, nonsteroidal anti-inflammatory agents (NSAIDs) and aminoglycosides
- ❑ Use of renin-angiotensin system (RAS) blockers among patients with diabetic kidney disease (DKD) and proteinuria
- ❑ Use of angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin-receptor blockers (ARBs) in patients with proteinuria

A prospective cohort study indicated that in patients with advanced CKD and stable hypertension, antihypertensive treatment with ACEIs or ARBs reduces the likelihood of long-term dialysis and lowers the mortality risk as well.

## Blood pressure control

Aggressive blood pressure control can help to delay the decline in renal function in patients with CKD. The different guidelines suggest a target blood pressure of less than 130/80 mm Hg.

Systolic blood pressure (SBP) control is considered more important than diastolic blood pressure control. However, SBP is also considered difficult to control in elderly patients with CKD.

ACEIs or ARBs to be used as tolerated, with close monitoring for renal deterioration and for hyperkalemia. With every dose change, serum creatinine levels need to be monitored. If serum creatinine levels increase more than 30% from baseline after adding rennin angiotensin system (RAS) blockers, RAS blockers should be stopped. These agents should be avoided in advanced patients with renal failure, bilateral renal artery stenosis or renal artery stenosis in a solitary kidney.

## Management of protein

Data support the use of ACEIs or ARBs in diabetic kidney disease with or without proteinuria. However, in nondiabetic kidney disease, these agents are effective in retarding the progression of disease among patients with proteinuria of more than 500 mg/day.

In the Modification of Diet in Renal Disease (MDRD) Study, dietary protein restriction (0.58 g/kg/day, versus a usual-protein diet of 1.3 g/kg/day) did not significantly affect the mean change in glomerular filtration rate (GFR) over 3 years. Secondary analyses, however, suggested that a low-protein diet may slow the GFR decline in patients with the most rapidly declining GFR and reduce proteinuria. A meta-analysis suggested that dietary protein restriction retards the rate of renal function decline, but the magnitude of the effect is relatively weak.

National Kidney Foundation (NKF) guidelines advise that if a patient is started on protein restriction, the patient's nutritional status should be closely monitored. Predialysis low serum albumin is associated with a poor outcome among dialysis patients. Protein restriction is not recommended in pediatric patients with CKD.

## Vitamin D supplementation

Paricalcitol, a synthetic vitamin D analogue, is approved by the US Food and Drug Administration (FDA) for the prevention and treatment of secondary hyperparathyroidism associated with CKD stage 5. However, a meta-analysis has found that paricalcitol also can safely reduce protein excretion in patients with CKD stages 2-5. Whether paricalcitol can slow the development of ESRD or reduce mortality is not yet known.

In a prospective, controlled study, daily vitamin D supplementation decreased albuminuria in patients with stage 3-4 chronic kidney disease (CKD) who had low vitamin D levels and high parathyroid hormone (PTH) levels.

## Nephrotoxins

A study found that a great number of individuals with CKD may be unaware of their disease and thus may be at risk for further kidney injury through use of NSAIDs.

However, despite the availability of guidelines and recommendations that include lists of medications that are relatively contraindicated and those that require renal dose adjustment, noncompliance with dosing guidelines and use of relatively contraindicated medications are common in patients with CKD. A cross-sectional study that included 373 adult patients with stage III/IV CKD found that 46.6% of them were prescribed at least one relatively contraindicated drug (acarbose, chlorpropamide, glyburide, nitrofurantoin or any NSAID) during the 2-year study period; 34.0% were prescribed NSAIDs.

Smoking cessation is encouraged, as smokers tend to reach ESRD earlier than nonsmokers. A large-population Norwegian study found that smoking cessation decreased the risk for future onset of kidney failure—especially in men, who tended to be heavier smokers than women in this cross-section.

### **Subclinical hypothyroidism**

A study revealed that patients with CKD stages 2–4 and subclinical hypothyroidism, thyroid hormone replacement therapy (THRT) with L-thyroxine delayed the rate of decline in kidney function to end-stage renal disease (ESRD).

Timely planning for long-term renal replacement therapy

The following to be considered:

- ❑ Early patient education regarding natural disease progression, different dialytic modalities, renal transplantation and option to refuse or discontinue chronic dialysis
- ❑ Timely placement of permanent vascular access.
- ❑ Timely elective peritoneal dialysis catheter insertion
- ❑ Timely referral for renal transplantation

### **Diet**

#### **Protein restriction**

Protein restriction early in chronic kidney disease (CKD) as a means to delay a decline in the glomerular filtration rate (GFR) is controversial; however, as the patient approaches CKD stage 5, this strategy is recommended in adults (but not in children) to delay the onset of uremic symptoms.

### **Salt restriction**

Reduction in salt intake may slow the progression of diabetic CKD, at least in part by lowering blood pressure. A meta-analysis found that dietary salt reduction significantly reduced blood pressure in type 1 and type 2 diabetes, with results comparable to those of single-drug therapy. This finding is consistent with other evidence relating salt intake to blood pressure and albuminuria in hypertensive and normotensive patients.

### **Other dietary restrictions**

The following dietary restrictions may also be indicated:

- ❑ Phosphate restriction starting early in CKD
- ❑ Potassium restriction
- ❑ Sodium and water restriction as needed to avoid volume overload

### **Fruits and vegetables**

A study showed that increasing the amount of alkali-inducing fruits and vegetables in the diet may help to reduce kidney injury. In this report, 30 days of a diet that included fruits and vegetables, in amounts calculated to reduce dietary acid by half, resulted in decreased urinary albumin, N-acetyl β-D-glucosaminidase and transforming growth factor β in patients with moderately reduced estimated GFR as a result of hypertensive nephropathy.

### **Prognosis**

Patients with chronic kidney disease (CKD) generally experience progressive loss of kidney function and are at risk for end-stage renal disease (ESRD). The rate of progression depends on age, the underlying diagnosis, the success of implementation of secondary preventive measures and the individual patient. Timely initiation of chronic renal replacement therapy is imperative to prevent the uremic complications of CKD that can lead to significant morbidity and death.

### **References:**

- ❑ BMJ, Sept., 2018
- ❑ Medscape, July 2018
- ❑ Mayo Clinic, May 2018
- ❑ N Engl J Med, Nov., 2017

**C**hickenpox is an infection caused by varicella zoster virus. Varicella zoster virus (VZV) is a dermotropic and neurotropic virus that produces primary infection, usually in childhood, which may reactivate in later life. VZV is spread by aerosol and direct contact. It is highly infectious to non-immune individuals. Disease in children is usually well tolerated. Manifestations are more severe in adults, pregnant women and the immunocompromised.



## Clinical Features

The incubation period is 11-20 days, after which a vesicular eruption begins, often on mucosal surfaces first, followed by rapid dissemination in a centripetal distribution (most dense on trunk and sparse on limbs). New lesions occur every 2-4 days and each crop is associated with fever. The rash progresses from small pink macules to vesicles and pustules within 24 hours. Infectivity lasts from up to 4 days (but usually 48 hours) before the lesions appear until the last vesicles crust over.

## Transmission

Chickenpox is a highly contagious disease. The virus spreads easily from people with chickenpox to others who have never had the disease or never been vaccinated. The virus spreads mainly through close contact with someone who has chickenpox.

The varicella-zoster virus also causes shingles. Chickenpox can be spread from people with shingles to others who have never had chickenpox or received the chickenpox vaccine. This can happen through close contact with someone who has shingles.

A person with chickenpox is contagious beginning 1 to 2 days before rash onset until all the chickenpox

lesions have crusted (scabbed). Vaccinated people who get chickenpox may develop lesions that do not crust. These people are considered contagious until no new lesions have appeared for 24 hours.

It takes about 2 weeks (from 10 to 21 days) after exposure to a person with chickenpox or shingles for someone to develop chickenpox. If a vaccinated person gets the disease, they can still spread it to others. For most people, getting chickenpox once provides immunity for life. However, for a few people, it is possible to get chickenpox more than once; although, this is not common.

## Diagnosis

Diagnosis is primarily clinical, by recognition of the rash. If necessary, this can be confirmed by detection of antigen (direct immunofluorescence) or DNA (PCR) of aspirated vesicular fluid. Serology is used to identify seronegative individuals at risk of infection.

## Management

The benefits of antivirals for uncomplicated primary VZV infection in children are marginal and treatment is not required. Antivirals are, however, used for uncomplicated chickenpox when the patient presents within 24-48 hours of onset of vesicles, in all patients with complications and in those who are immunocompromised, including pregnant women, regardless of duration of vesicles. More severe disease, particularly in immunocompromised hosts, requires initial parenteral therapy. Immunocompromised patients may have prolonged viral shedding and may require prolonged treatment until all lesions crust over.

### *Aciclovir for chickenpox/Shingles:*

Aciclovir shortens symptoms in chickenpox by an average of 1 day. In shingles, aciclovir reduces pain by 10 days and the risk of post-herpetic neuralgia by 8%. Aciclovir is therefore cost-effective in shingles but not chickenpox.

### *Aciclovir for Immunocompromised host/Pregnant woman:*

Aciclovir 5 mg/kg 3 times daily IV until patient is improving, then complete therapy with oral therapy until all lesions crusting over.

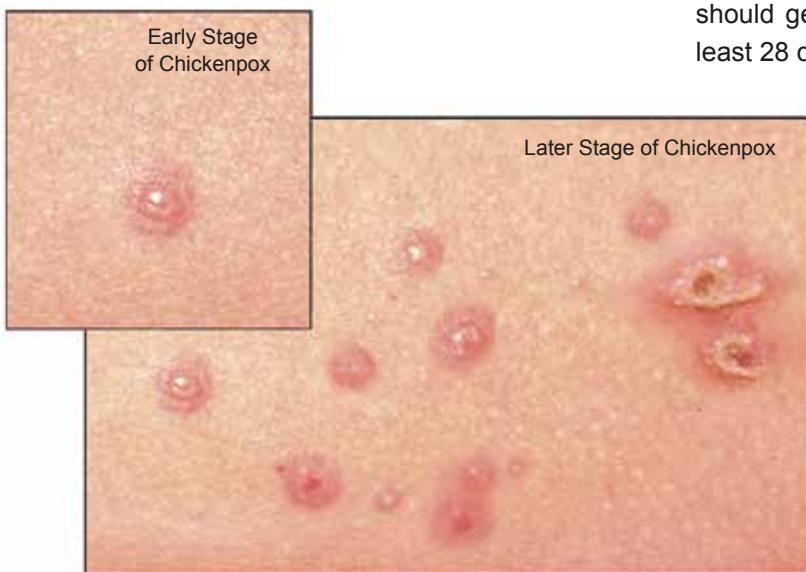
## Complications

Complications from chickenpox can occur, but they are not common in healthy people who get the disease.

People who may get a serious case of chickenpox and may be at high risk for complications include:

- ❑ Infants
- ❑ Adolescents
- ❑ Adults
- ❑ Pregnant women
- ❑ People with weakened immune systems because of illness or medications, for example,
  - People with HIV/AIDS or cancer
  - Patients who have had transplants and
  - People on chemotherapy, immunosuppressive medications or long-term use of steroids.

Due to intense itching, secondary bacterial infection from scratching is the most common complication of primary chickenpox. Self-limiting cerebellar ataxia and encephalitis are rare complications.



Adults, pregnant women and the immunocompromised are at increased risk of visceral involvement, which presents as pneumonitis, hepatitis or encephalitis. Pneumonitis can be fatal and is more likely to occur in smokers. Maternal infection in early pregnancy carries a 3% risk of neonatal damage with developmental abnormalities of eyes, CNS and limbs. Chickenpox within 5 days of delivery leads to

severe neonatal varicella with visceral involvement and hemorrhage.

Some people with serious complications from chickenpox can become so sick that they need to be hospitalized. Chickenpox can also cause death.

Deaths are very rare now due to the vaccine program. However, some deaths from chickenpox continue to occur in healthy, unvaccinated children and adults. In the past, many of the healthy adults who died from chickenpox contracted the disease from their unvaccinated children.

## Prevention

The best way to prevent chickenpox is to get the chickenpox vaccine. Everyone - including children, adolescents and adults - should get two doses of chickenpox vaccine if they have never had chickenpox or were never vaccinated.

- ❑ Children get the first dose of chickenpox vaccine at 12 through 15 months old and the second dose at age 4 through 6 years.
- ❑ People 13 years of age and older who have never had chickenpox or been vaccinated should get two doses of chickenpox vaccine at least 28 days apart.

Chickenpox vaccine is very safe and effective at preventing the disease. Most people who get the vaccine will not get chickenpox. If a vaccinated person does get chickenpox, the symptoms are usually milder with fewer or no blisters (they may have just red spots) and mild or no fever.

The chickenpox vaccine prevents almost all cases of severe illness. Since the varicella vaccination program began in the United States, there has been over 90% decrease in chickenpox cases, hospitalizations and deaths.

## References:

- ❑ Davidson's Principles & Practice of Medicine
- ❑ The Journal of the American Medical Association
- ❑ <https://www.cdc.gov/chickenpox/index.html>
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The people of Bangladesh are living on adulterated food. Bangladesh is over burdened with laws for safety and security of food but irony is that food is most unsafe in Bangladesh. The food safety situation in Bangladesh is at an alarming stage due to food adulteration, use of toxins, pesticide residues, microbiological contamination, veterinary drug residues and heavy metals. It is paradoxical to say that the safety of food cannot be ensured due to the dilemma of existing legal paradigm in Bangladesh. According to the World Health Organization and Food & Agriculture Organization, nearly 45 lakh people in Bangladesh are being infected with various diseases every year. In a recent research of Ministry of Health, food adulteration has been marked as one of the main reasons for the rise of cancer, liver and kidney diseases.

'Food' is essential for every living being on earth. On the other hand the word 'Adulterate' implies an element of deceit. The term 'Food Adulteration' can be simply defined- as an act of intentional debasing the quality of food offered for sale either by the admixture or substitution of inferior substances or by the removal of some valuable ingredient. The meaning of adulteration varies from country to country on the basis of municipal law. If a food exceeds tolerances and regulatory limits of the country, it will be considered adulterated. From the Bangladeshi legal paradigm, in a strict sense, the word 'adulteration' has not been defined in anywhere of the laws prescribed. Nonetheless, by the practices, food adulteration in Bangladesh means adding harmful chemicals, toxic colors or harmful additives with the food.

### Objectives

Adulterants are added to food or food adulteration may occur for the following reasons in a nutshell-

- ❑ To increase the bulk and reduce cost, with intent to defraud the consumer;
- ❑ To increase the quantity and make more profit;
- ❑ To increase the shelf life of food items;
- ❑ To attract the consumers;
- ❑ To increase the profit margin on the expense of the health of public or consumer; etc.

### Nature of Food Adulteration in Bangladesh

Adulteration may occur in simple three following basic patterns-

- ❑ By adding anything(various kind of adulterants) with the food to deteriorate from the nature, substance and quality of the food desired by the purchaser;
- ❑ By removing or reducing and substituting any element or ingredient from the food to deteriorate from the nature, substance and quality of the food desired by the purchaser;
- ❑ By false representation of a completely different item to be a food of specific kind.

**Firstly**, adding adulterant is the main cause of food adulteration. Adulterants can be anything that will decrease the quality of the product. The addition of adulterant in food may be intentional or accidental. But generally the adulterate addition is intentional. If the adulterant is naturally present in a food in an amount not ordinarily making the food harmful for health, the food will not be deemed as adulterated.

Adulterants may be solids, chemicals, liquids, coloring substances and preservative.

- ❑ **Solids** like sands, chalk-powder, crushed rocks, seeds of similar crops, bricks powder, wood powder, tamarind seed powder, detergent powder etc. are mixed with grains or with powdery substances to increase the weight;
- ❑ **Chemicals** are applied to increase the shelf of processed or semi-processed food item such as formaldehyde (commonly known as formalin), various compounds of Carbide i.e. calcium Carbide; urea, artificial sweeteners some chemicals are used for ripening of fruits and vegetables. For example, bananas are picked when green and artificially ripened after shipment by being gassed with ethylene. Calcium carbide is also used for ripening fruit artificially in our country which is inadvisable because calcium carbide has carcinogenic properties. Industrial-grade calcium carbide may also contain traces of arsenic and phosphorus which makes it a human health concern.
- ❑ **Preservatives** mean 'any substance which is capable of inhibiting, retarding or arresting the process of fermentation, acidification or other decomposition or deterioration of food.' A preservative is a substance that is added to food to prevent decomposition by microbial growth or by undesirable chemical.

- **Coloring/flavoring reagents** like textile and synthetic colors, dyes and pigments, toxic artificial flavor etc. are added to improve the color of food items. These are added to food to give an attractive appearance. The gloss of these coloring and flavoring reagents in food item make them more bright and eye catcher and allure the purchasers to buy it.
- **Pesticides and Insecticide** are used at the time of farming of the plants or herbs for the purpose of the pest control. This is an indirect way of food adulteration like using growth hormone on the plants or herbs to enhance the production of the corps or fruits etc. DDT (di-chloro di-phenyl tri-chloro ethane), various chlorinated aromatic hydrocarbons and synthetic organic compounds etc. are widely used in these purposes. These tend to persist in the plants or the environment at a whole as a residue and become concentrated in animals and human being at the head of the food chain.

**Secondly**, adulteration may also happen by removing or reducing and substituting a fair part or any ingredient of the food item, for instance- removing milk fat from the cow milk and buffalo milk to lower down its quality. Any food item (i.e. Sweetmeat, Sweet ball, Kalakand, Channa, Curd, Yogurt and Cream etc.) made of that kind of cow milk or buffalo milk never can reach the food value and fall very short of specified milk fat required and eventually results in adulterated food.

**Thirdly**, sometimes a completely different kind of thing can be represented as food item of a specified kind. For example- condensed milk has no element of milk at all in it. BSTI's license conditions requires that- the condensed milk must contain 8% milk fat, extracted either from cow or buffalo milk. The Pure Food Ordinance has a higher standard than those of BSTI in case of Condensed Milk. In the year 2003 the condensed milk producing companies in Bangladesh demanded making a new standard for them by BSTI so that condensed milk with vegetable fat, arguing that such production is seen in Malaysia. Considering the health consequences, the BSTI rejected the appeal, prompting the companies to file a writ petition with the court that is

yet to settle the case. Thus, the companies continued producing and marketing condensed milk with palm or soya bean fat. Then water, palm stearin (instead of edible palm oil) and sugar are added to make condensed milk which is simply poisoning the people as the palm stearin is not edible; it is used in detergent making.

## Major Food Groups Commonly Associated with Adulterants

Proportion of adulterated and fake food item in the market varied between 70 to 90 percent. Basic food item in the market like rice, fish, fruits, vegetables, spices, milk and milk products, sweetmeats etc. are adulterated. Infested and damaged grains, husks, sand and beads are added to increase the weight. Edible oil, ghee, butter oil, mustard oil is adulterated with hydrogenated oil, animal fats and rap seed oil. Vanaspati is added in ghee. Artificial sweeteners and flavors, un-permitted colors, excess colors are added to the Confectionery and bakery. Fat is extracted from milk and water is added and synthetic milk (liquid detergent, sugar, water, vegetable fat, urea etc.) is in the stores. Powder milk is adulterated with melamine. Condense milk is made by using stearin and without any element of natural milk.

Formalin and DDT is applied on fish to increase their shelf life, ethylene and calcium carbide on fruits for quick ripening or delay ripening, urea to whiten the puffed rice and textile dyes to beautify the sweetmeats. Heavy metals, such as lead, chromium and arsenic accumulate in the body that might cause kidney and liver failure and develop abnormality among children. Excessive use of wheat flour in place of milk protein (chhana) in the preparation of sweetmeat is an example of adulteration. Use of carboxyl methyl (CMC) in lieu of liquid glucose or sugar syrup in the preparation of soft drinks is an example of extortion. Fruit juices are prepared by using artificial and prohibited ingredients instead of using original fruit juice.

## Method of Food Adulteration

Food adulteration is an unethical business practice. It may occur at any time or any layer along the entire supply chain of the food, from producer to consumer and from 'Farm to Fork'.

- Directly to the hands of the consumers or
- First to retailers and then to consumers or
- First to wholesalers, then to retailers and at last to consumers or
- First to local agents or brokers then to manufacturers later on to wholesalers, then to retailers and at last to consumers etc.

So, adulteration of food may happen in any of the layers or steps in the process of reaching the food from the farm or production to the fork of the consumers shown above. As an example-mango fruits are collected from various gardens of Rajshahi and Chapainawabganj districts by the local agents. Before shipment some of mangoes may be made calcium carbide or/and formalin tainted by the dealers. Same may be done during the change made in between the wholesalers and retailers.

Again, food adulteration also may happen in the following stages by the ill will of the farmer/ producer or agent/broker or manufacturer or wholesaler or retailer at-

- Primary production stage;
- Post-harvest food handling, preservation, processing, packaging, transport, storage and distribution;
- Food Services Sector- Fresh produces, semi-processed, processed, ready to eat (RTE), hotel, restaurant, street foods etc.

#### **Effects of Food Adulteration**

Followings can be the probable results of food adulteration-

- Consumers are cheated by the traders. Consumers take impure, unsafe and incomplete food;
- Reduces the quality of the food and this weakens the health of the consumers and thereby increases the cost for healthcare;
- Regular intake leads to many health problems

from curable to incurable disorders and can ruin one's lifestyle and life as well;

- Food adulteration poses a very serious health hazard. Use of non-permitted chemicals causing a number of diseases including cancer, convulsion and miscarriage, respiratory problem, disorder of some organs of the body;

- Consumption of adulterated food items may precisely cause asthma, sore throat, larynx constriction, bronchitis, skin infection, allergic reaction, diarrhea, hematuria, circulatory failure, numbness, dizziness, kidney failure, stomach, cancer, nervous disorder and other diseases;

- Adulteration in food also decreases our moral and social values. A large number of people and companies are engaged in this kind of black business of adulterated food production, manufacture, wholesale and retailing. The entire chain makes involved a lot of people in a criminal act which requires a tremendous government effort with a proper infrastructure to combat this.

#### **International Commitments of Bangladesh**

Bangladesh ratified various international instruments regarding 'Right to Food', i.e.

- The Universal Declaration of Human Rights (UDHR) 1948;
- The International Covenant on Economic, Social and Cultural Rights (ICESCR) 1966 and
- The Convention on the Rights of the Child (CRC) 1990 where right to food is guaranteed.

Right to food is directly related to ICESCR as it is one of the economic, social and cultural rights and Bangladesh ratified this covenant on 5 October, 1998. Here, it is very precisely notable that every kind of food or food stuffs means and includes that food which is free from adulteration, contamination etc. of any kind.



## List of Injurious Adulterants of Different Food and Harmful Effect

Name of Adulterants	Applied Food Item	Harmful Effect
Formalin	Fish, fruit, meat and milk	Throat cancer, kidney cancer, blood cancer, asthma and skin diseases.
Poisonous coloring agents like auramine, rhodamine B, malachite green and Sudan red	Applied on food item for coloring, brightness and freshness.	Damage liver and kidney and cause stomach cancer, asthma and bladder cancer.
Coloring agents chrome, tart zinc and erythrosine	Used in spices, sauces and juices, lentil and oils	Causing cancer, allergy and respiratory problems.
Calcium carbide	Mango, banana etc.	Causes cancer in kidney, liver, skin, prostate and lungs.
Rye flour	Used in barley, bread and wheat flour	Convulsion and miscarriage.
Hormone	Cauliflower, pineapple	Causes infertility of women.
Agino moto or monosodium glutamate	Used in Chinese restaurant food item.	Cause nervous system disorder and depression.
Urea	Puffed rice and rice.	Nervous system damage and respiratory problem.
Sulphuric acid	Used in milk for condensation	Causes damage to the cardiac system.
Brick powder, saw dust	Chili powder	Stomach problem.
Non permitted dye like mentanil yellow	Turmeric powder	Carcinogenic.
Used tea leaves processed and colored	Tea	Liver disorder.
Non permitted coalter dye, (mentanil yellow)	Sweets, juice, jam etc.	Toxic and carcinogenic.
Artificial colors such as copper, zinc or indigo based dyes	Soft and hard drinks	Toxic.

So, being signatory and ratifying the above mentioned global instruments, Bangladesh guarantee the 'Purity in Food' in every aspect.

### Limitation of Food Adulteration Surveillance

The situation of adulteration is graver in rest of the country than the Dhaka city. All the few food laboratories under various governments, autonomous and international organizations in Bangladesh are situated either in Dhaka or neighboring Dhaka. However, very few of those are operating down to the regional and district level.

The Public Health Food Laboratory provides the certificate of analysis or bacteriological or other examination for food samples in Bangladesh. City Corporations of Dhaka, Chittagong, Rajshahi, Barisal, Khulna, Sylhet or any other city corporations or pourashavas being the local authorities have to have food testing laboratory. In reality only Dhaka

City Corporations have only one lab. Every other city corporations, pourashavas or the Civil Surgeon offices depend only on the Public Health Food Laboratory situated at Mohakhali. It is observed that if a food sample is collected in apprehension of adulteration anywhere in Barisal or Rangpur it may take more than 06 months to send a sample and to obtain a certificate from this lab. If it takes such a long time, the food sample collected for that purpose might have destroyed or spoiled or go wrong in the transit of package. Thus food safety in these areas is very critical and the culprits involved in the vicious circle of food adulteration never meet the justice.

### Step to Minimize Food Adulteration

It is hard to eradicate Food adulteration from a third world country like Bangladesh. Nonetheless, following observations may lead the path ways to combat well the adulteration of food items.

- ❑ The consumers must give up the Compromising attitude towards food adulteration;
- ❑ Implementation strategies of laws must be outlined clearly for a better enforcement regime so that all instances of non-compliance can be easily identified and action taken promptly by the proper authority;
- ❑ Pure food Courts being the Courts of original jurisdiction, only deal with the Pure Food Ordinance. Every Pure Food Court must be given power take cognizance and dispose any complaint under all the food related laws of land.
- ❑ Government must take the Pure Food Ordinance as the only governing law of the food sector in real essence. BSTI's interference in setting standard or procuring parallel certificate of standard of food in breach of the Pure Food Ordinance must be stopped;
- ❑ The Food Safety Act, 2013, concerned rules of the Act and Formalin control Laws should be made operative as early as possible;
- ❑ Government must ensure transparency and accountability in inspection procedure, analysis of food and prosecution method. Offenders must be prosecuted indiscriminate to any consideration. Credible laboratory services for food analysis and risk based food inspection system to be in place;
- ❑ Well-equipped laboratories for every kind of food analysis such as- tests for formalin, carbide, DDT, preservative and color check, with skilled personnel's must be established in each district all over Bangladesh;
- ❑ Power of cancellation of the trade license or to make such recommendation to the concerned authority for persistent offenders (the owners of the companies) should be given to the Pure Food Courts;
- ❑ Awarding exemplary punishment to those who contaminate food items with formalin and other toxic chemicals the penalties need to include rigorous imprisonment for long periods and relatively heavy fines.
- ❑ Carriage of food especially fruits; fresh vegetables, milk, fish etc. should be given preference at the time of transportation as if those can reach the destination without delay. Then it will be no more required to add preservative, formalin, DDT etc. to increase the life shell of that food;
- ❑ The government and regulatory bodies must be driven by professional obligations not by media propaganda;
- ❑ Creation of mass communication, motivation, awareness and training of food producers, operators, consumers against the use of formalin and other chemical substances in food items;
- ❑ Persuasive measures like caution notice, improvement notice may be involved in the enforcement mechanism.
- ❑ Inclusion of course regarding the fatal impacts of food adulteration in curriculum at different levels.

## **Safe food saves life**



The people of Bangladesh have the every legitimate expectation to get the food free from adulteration as of our constitutional right. This is the responsibility of the state apparatus to ensure that for the common people. Food adulteration can be substantially combat by the legal paradigm presently with few renovations of law. But it is very important, how these laws are being implemented by the state. No more hyperactive drives without following the spirit of law by the Mobile Courts are expected, because judicially established courts are there to act under the protocol of law. The manufacturers and producers should not hanker after money by the way of delivering adulterated food to the innocent people. Let us live and let others live on food free from adulteration of any kind. As Virginia Wolf, famous English writer said while describing food as medicine –

‘One cannot think well, love well, sleep well, if one has not dined well.’

### **References:**

- ❑ [www.researchgate.net](http://www.researchgate.net)
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An accident which occurred or originated on a way or street open to public traffic; resulted in one or more persons being killed or injured and at least one moving vehicle was involved, is known as road traffic accident (RTA). These accidents therefore include collisions between vehicles, between vehicles and pedestrians and between vehicles and animals or fixed obstacles.

Road traffic accidents—the leading cause of death by injury and the tenth-leading cause of all deaths globally—now make up a surprisingly significant portion of the worldwide burden of ill-health.

Every year the lives of approximately 1.35 million people are cut short as a result of a road traffic crash. Between 20 and 50 million more people suffer non-fatal injuries, with many incurring a disability as a result of their injury.

Road traffic injuries cause considerable economic losses to individuals, their families and to nations as a whole. These losses arise from the cost of treatment as well as lost productivity for those killed or disabled by their injuries and for family members who need to take time off work or school to care for the injured. Road traffic crashes cost most countries 3% of their gross domestic product.

## Risk Factors

### Socioeconomic status

More than 90% of road traffic deaths occur in low- and middle-income countries. Road traffic injury death rates are highest in the African region. Even within high-income countries, people from lower socioeconomic backgrounds are more likely to be involved in road traffic crashes.

### Age

Road traffic injuries are the leading cause of death for children and young adults aged 5-29 years.

### Sex

From a young age, males are more likely to be involved in road traffic crashes than females. About three quarters (73%) of all road traffic deaths occur among young males under the age of 25 years who are almost 3 times as likely to be killed in a road traffic crash as young females.

## Contributing Factors

### Speeding

An increase in average speed is directly related both

to the likelihood of a crash occurring and to the severity of the consequences of the crash. For example, every 1% increase in mean speed produces a 4% increase in the fatal crash risk and a 3% increase in the serious crash risk. The death risk for pedestrians hit by car fronts rises rapidly (4.5 times from 50 km/h to 65 km/h).

### Driving under the influence of alcohol and other psychoactive substances

Driving under the influence of alcohol and any psychoactive substance or drug increases the risk of a crash that results in death or serious injuries. In the case of drug-driving, the risk of incurring a road traffic crash is increased to differing degrees depending on the psychoactive drug used. For example, the risk of a fatal crash occurring among those who have used amphetamines is about 5 times the risk of someone who hasn't.

### Nonuse of motorcycle helmets, seat-belts and child restraints

Correct helmet use can lead to a 42% reduction in the risk of fatal injuries and a 69% reduction in the risk of head injuries. Wearing a seat-belt reduces the risk of death among drivers and front seat occupants by 45 - 50% and the risk of death and serious injuries among rear seat occupants by 25%. The use of child restraints can lead to a 60% reduction in deaths.

### Distracted driving

There are many types of distractions that can lead to impaired driving. The distraction caused by mobile phones is a growing concern for road safety.

Drivers using mobile phones are approximately 4 times more likely to be involved in a crash than drivers not using a mobile phone. Using a phone while driving slows reaction times and makes it difficult to keep in the correct lane and to keep the correct following distances. Hands-free phones are not much safer than hand-held phone sets and texting considerably increases the risk of a crash.

### Unsafe road infrastructure

The design of roads can have a considerable impact on their safety. Ideally, roads should be designed keeping in mind the safety of all road users. This would mean making sure that there are adequate facilities for pedestrians, cyclists and motorcyclists.

Measures such as footpaths, cycling lanes, safe crossing points and other traffic calming measures can be critical to reducing the risk of injury among these road users.

### **Unsafe vehicles**

Safe vehicles play a critical role in averting crashes and reducing the likelihood of serious injury. There are a number of United Nations (UN) regulations on vehicle safety that, if applied to countries' manufacturing and production standards, would potentially save many lives. These include requiring vehicle manufacturers to meet front and side impact regulations, to include electronic stability control (to prevent over-steering) and to ensure airbags and seatbelts are fitted in all vehicles.

### **Inadequate post-crash care**

Delays in detecting and providing care for those involved in a road traffic crash increase the severity of injuries. Improving post-crash care requires ensuring access to timely prehospital care and improving the quality of both prehospital and hospital care, such as thorough specialist training programs.

### **Inadequate law enforcement of traffic laws**

If traffic laws on drink-driving, seat-belt wearing, speed limits, helmets and child restraints are not enforced, they cannot bring about the expected reduction in road traffic fatalities and injuries related to specific behaviors. Effective enforcement includes establishing, regularly updating and enforcing laws at the national, municipal and local levels that address the above mentioned risk factors. It includes also the definition of appropriate penalties.

## **Consequences**

Developing countries bear a large share of the burden, accounting for 85 percent of annual deaths and 90 percent of the disability-adjusted life years (DALYs) lost because of road traffic injury. And since road traffic injuries affect mainly males (73 percent of deaths) and those between 15 and 44 years old, this burden is creating enormous economic hardship due to the loss of family breadwinners. The costs and consequences of these losses are significant. Three-quarters of all poor families who lost a member to road traffic death encountered a reduction in their standard of living and 61 percent of them had to

borrow money to cover expenses following their loss. Direct consequences of accidents are fatality (death), injury, property damage.

### **Serious injuries**

Those are fractures, concussions, internal lesions, crushing, severe cuts and laceration, severe general shock requiring medical treatment and any other serious lesions entailing detention in hospital.

### **Survival after a crash**

Injury care is extremely time-sensitive: delays of minutes can make the difference between life and death. Fatality rates from severe injury are dramatically higher in low- and middle-income countries than in high-income countries with well-developed emergency care systems.

Timely emergency care saves lives and reduces disability, but there is great global disparity in access to emergency care. If fatality rates from severe injury were the same in low- and middle-income countries as they are in high-income countries, up to 500 000 road traffic fatalities could be averted every year.

### **First Aid in Road Accidents**

Many deaths and impact of injuries can be prevented with first aid if casualties are treated immediately.



The basic aims of first aid are

- To save life,
- To protect the casualty from getting more harm,
- To reduce pain and priorities of casualty treatment.

Timely managements in a RTA situation can be as follows.

### **Critical 4 minutes**

One of the most common causes of a road accident death is due to loss of oxygen supply.

This is mostly caused by a blocked airway. Normally it takes less than 4 min for a blocked airway to cause death.

### The “golden hour”

The first hour after the trauma is called the “golden hour”. If proper first aid is given, road accident victims have a greater chance of survival and a reduction in the severity of their injuries.

### Measures to Address Road Traffic Injuries

Road traffic injuries can be prevented. Governments need to take action to address road safety in a holistic manner. This requires involvement from multiple sectors such as transport, police, health, education and actions that address the safety of roads, vehicles and road users.

Effective interventions include designing safer infrastructure and incorporating road safety features into land-use and transport planning, improving the safety features of vehicles, improving post-crash care for victims of road crashes, setting and enforcing laws relating to key risks and raising public awareness.

### Coordinating the Decade of Action for Road Safety

WHO is the lead agency – in collaboration with the United Nations regional commissions – for road safety within the UN system. WHO chairs the United Nations Road Safety Collaboration and serves as the secretariat for the Decade of Action for Road Safety 2011– 2020. Proclaimed through a UN General Assembly resolution in 2010, the Decade of Action was launched in May 2011 in over 110 countries, with the aim of saving millions of lives by implementing the Global Plan for the Decade of Action.

WHO also plays a key role in guiding global efforts by continuing to advocate for road safety at the highest political levels; sharing information with the public on risks and how to reduce these risks; and drawing attention to the need for increased funding.

### The Safe System approach: accommodating human error

The Safe System approach to road safety aims to ensure a safe transport system for all road users.

Such an approach takes into account people's vulnerability to serious injuries in road traffic crashes and recognizes that the system should be designed to be forgiving of human error. The cornerstones of this approach are safe roads and roadsides, safe speeds, safe vehicles and safe road users, all of which must be addressed in order to eliminate fatal crashes and reduce serious injuries.

### Managing risk exposure with land-use

Promoting efficient patterns of land use and providing shorter, safer routes for vulnerable road users can reduce their exposure. In some countries, pedestrians would rather cross a dangerous road than go out of their way to take a pedestrian bridge, even though such preferences increased their exposure to injury risk. Improving public transportation systems can also reduce exposure.



### Planning and designing roads for safety

In almost all countries, road networks are designed from the perspective of the motor vehicle user. But developing countries can take lessons from safety conscious road design in countries such as the Netherlands and Denmark, where roads are built to suit their function (high speed, rural, transitional between high speed and rural and residential) and account for the safety of pedestrians and cyclists.

### Providing visible, crashworthy and smart vehicles

Designing motorized vehicles that are more crash-worthy is an important intervention in those developing countries where automobile safety regulations are more lax than in developed countries. Improving the visibility of drivers in other instances (such as at night or during fog) can reduce injuries. Daytime running lights and high-mounted stop lamps have improved crashes in these cases, as have reflectors and colorful clothing.

New technologies have created other avenues for road safety. These developments include intelligent speed adaptation; alcohol-ignition interlock systems that detect alcohol on the breath of drivers; or electronic driver improvement monitors that connect individual driver profile assessments.

### **Setting road and safety rules, securing compliance and improving transport policy**

Setting and enforcing speed and blood alcohol concentration limits have proven to be perhaps the most successful interventions contributing to the decrease in injury in developed countries. Speed limiting devices on vehicles, limits on engine power and non-vehicular traffic-calming measures hold the greatest promise in developing countries. In developing countries, car occupants constitute less than 10 percent to 20 percent of traffic fatalities. These countries also need to improve helmet safety and use among two- and three-wheel vehicle operators as well as to enforce the appropriate number of passengers for these vehicles.

### **Road Safety Related Sustainable Development Goals (SDG) and Targets**

#### **SDG Goal 3: Ensure healthy lives and promote well-being for all at all ages**

**Target 3.6:** By 2020, halve the number of global deaths and injuries from road traffic accidents

#### **SDG Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable**

**Target 11.2:** By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.

### **Challenges to Public Health**

Although some interventions from developed countries can be applied in developing-country settings, interventions are often situation-specific. In addition, the traffic patterns in developing countries (especially in urban areas) are more complex because of high-density living and mixed land use, severe limitation of resources and the abundance of shantytowns. In Bangladesh, the challenges to road safety initiatives are -

- Under reporting of accidents
- Institutional weaknesses
- Lack of professional capacity & expertise
- Lack of strong political support & commitment
- Bureaucratic complexity & corruption
- Lack of government & public partnership
- Lack of international linkage

### **Overview**

The scientific evidence on the magnitude, risk factors and effective interventions for the prevention of road traffic injury is reasonably well documented and readily available. As with other policy areas, such knowledge alone cannot bring about a change in the road safety situation; the real challenge is how to translate that knowledge into sustainable solutions in different contexts. The real issue is the leveraging of opportunities and challenges in different policy contexts.



Change in road safety policy, as in other areas of policy, is generally a progressive and iterative process that requires continued improvements and innovations. Improving road safety policy is not a one-off event, but rather the pursuit of a long-term collective action. To do so is to see the road safety targets of the SDGs as the beginning of a journey to change in road safety policy – a journey that needs to run its full course at both national and local levels.

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- [www.oecd.org/health](http://www.oecd.org/health)
- [www.researchgate.net](http://www.researchgate.net)

## Test Yourself - 48

### Correct Answers :

1. b    2. a    3. b    4. a    5. d    6. b

**CONGRATULATIONS!**



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## Test Yourself - 49

1. The followings are true for "Chicken Pox" except:
  - a. Manifestations are more severe in children, pregnant women and the immunocompromised.
  - b. New lesions occur every 2-4 days and each crop is associated with fever.
  - c. Infants, adults, pregnant women are among the high risk for complications.
  - d. The chicken pox vaccine prevents almost all cases of severe illness.
2. All the followings are correct for "Food Adulteration in Bangladesh" except:
  - a. Adulterants may be solids, liquids, chemicals, coloring substances and preservatives.
  - b. Proportion of adulterated and fake food items in the market varied between 70 – 90 percent.
  - c. Using of non- permitted chemicals causes a number of diseases like cancer, respiratory disorders, convulsion and miscarriage.
  - d. Calcium carbide causes nervous system disorder and depression in human.
3. All the below are true for "Chronic Kidney Disease (CKD)" except:
  - a. All forms of CKD are also associated with tubulointerstitial disease.
  - b. Recurrent renal stone, urinary tract obstruction are among the causes of CKD.
  - c. Reduction in GFR (45 – 59 mL/min/1.73m<sup>2</sup>) is the 3b stage of CKD.
  - d. Patients with CKD stages 1 – 3 are frequently asymptomatic.
4. All the followings are correct for "Road Traffic Accident (RTA)" except:
  - a. Road traffic accident is the tenth leading cause of all deaths globally.
  - b. The first two hours after the trauma is called the "golden hour".
  - c. Correct helmet use can lead to a 69% reduction in the risk of head injuries.
  - d. Drivers using mobile phones are about four times more likely to be involved in a crash.
5. The followings are right for "Food Adulteration in Bangladesh" except:
  - a. The meaning of food adulteration varies from country to country on the basis of municipal law.
  - b. Monosodium Glutamate may cause infertility and convulsion in women.
  - c. Using pesticides and insecticides is the indirect way of food adulteration.
  - d. Food adulterations may happen in primary production stage, post harvest food handling, food services sectors.
6. All the followings are correct for "Chronic Kidney Disease (CKD)" except:
  - a. Anemia in CKD manifests as fatigue, reduced exercise capacity, reduced quality of life only.
  - b. The blood urea nitrogen and serum creatinine levels will be elevated in patients with CKD.
  - c. American Society of Nephrology strongly advocates CKD screening even in patients without risk factor for CKD.
  - d. Aggressive blood pressure control can help to delay the decline in renal function in patients with CKD.



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