Report on A Prospective Study on The Prevalence of Stroke and its Prevention in Mechi Nagar Nagarpalika (Town Municipality) in Jhapa District.

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Submitted by:

Dr. Krishna Kumar Oli, Ph.D. Neurology

Dr. Riru Prasad Gartoulla, Ph.D. Medical Anthropology

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Research Team

Principal Investigators

Dr. Krishna Kumar Oli

Dr. Ritu Prasad Gartoulla

Advisors

Prof. Dr. Gopal Acharya

Dr. Komal Gyawali

Associates

Mr. Rabin Koirala

Mr. Chandra Bhandari

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Dr. K.K. Oli

Dr. R.P. Gartoulla

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Summary

Vascular disease of the brain is a major problem in modern neurology. It includes all disorders in which an area of the brain is transiently or permanently affected by ischemia or bleeding and one or more of the cerebral vessels are involved in the pathological process. Cerebro vascular disease is the third leading cause of death after heart disease and malignancy in the USA and is the most disabling or neurologic disease.

As of date no single work has been done critically analysed on the main risk factors for stroke in Nepalese population. Therefore, our main objective was to detect the prevalence of stroke and its risk factors, and educate the community people for its prevention in villages and communities in Mechi Nagar Nagarpalika (Town municipality), Jhapa, Nepal. About 2988 household heads of 14849 population was screened for the symptoms of strokes. Of the total 14839 population, 114 persons (3.8 percent of the total households and 0.8 percent of the population) had stroke. The instrumentation used for the study were questionnaire, clinical equipments such as stethoscopes, BP instruments, ECG, weighing machine, nutrition chart and other health related chart for education of the population.

Hypertension was found in 70 percent and diabetes mellitus was 12.2% in 114 of the stroke patients. Cardiac pathology was a major risk factor especially in economically active age group < 50 years. This study shows that hypertension and diabetes mellitus are a major risk factor for stroke in that particular population. Patient with rheumatic heart disease with or without atrial fibrillation (AF), should have monitoring and full treatment to prevent thromboembolic strokes. For that standard anticoagulation laboratory should be established in the primary, secondary and tertiary centre. Facility of echocardiography study to be established to evaluate the cardiac status as well as to rule out intramural thrombus to prevent thromboembolic stroke. A computed tomomogrpahy should be established in primary health centre for the differentiated management of strokes.

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1. Introduction

Anatomy

1. Carotid Artery distribution: Carotid arteries perfuse the majority of the cerebrum common carotid Artery - splits into the Internal Carotid Artery and the External Carotid Artery, then the internal Carotid Artery - divides into the Anterior Cerebral Artery (ACA) and the Middle Cerebral Artery (MCA); both a left and right side are present

a. ACA supplies the medial surface of the frontal lobe, parietal lobe and occipital lobe
b. MCA-the largest branch of the internal carotid artery

1. Vertebral - Distribution: Perfuse base of cerebrum and majority of cerebellum.
2. Vertebral Arteries - Join to form the Basilar Artery - branching from the Basilar Artery are the 2 Posterior Cerebral Arteries (PCA).
3. Basilar Artery and PCA - supply the occipital lobe, brain stem and cerebellum.

Classification of ischemic events

(These are based on the temporal course and eventual outcome).

1. Transient Ischemic Attacks (TIAs):
    a. episodes of a temporary reduction in perfusion to a focal region of the brain causing a short-lived disturbance of function
    b. the patient experiences a temporary focal neurological deficit such as slurred speech, aphasia, amaurosis fugax (monocular blidness), or weakness or paralysis of a limb
    c. conset is rapid; usually onset is less than 5 minutes
    d. duration usually 2-15 minutes; can last up to 24 hours
    e. symptoms (vary depending on the CNS anatomy involved)

1. sensation of swelling or numbness of the hand, arm, or one side of the face or tongue
2. loss of strength in an arm, hand or leg
3. difficulties in speaking or reading

f. no neurological deficit remains after the attack

g. one episode in a lifetime to > 20 in one day

h. may be the only warning of an impending stroke

2. **Reversible Ischemic Neurological Deficit (RIND)**

a. focal brain ischemia in which the deficit improves over a maximum of 72 hours

b. deficits may not completely resolve in all cases

3. **Cerebral Infarction**

a. permanent neurological disorder, the patient presents with fixed deficits

b. can present in 3 forms:

1. Stable - the neurological deficit is permanent and will not improve or deteriorate
2. improving - return of previously lost neurological function over several days to weeks
3. progressing - the neurological status continues to deteriorate following the initial onset of focal deficits; may see a stabilization period, followed by further progression

Pathophysiology

1. Atherosclerosis and subsequent plaque formation results in arterial narrowing or occlusion and is the most common cause of arterial stenosis.
2. Thrombus formation is most likely to occur in areas where atherosclerosis and plaque deposition have caused the greatest narrowing of vessels.

3. Platelet aggregation
    a. exposed subendothelium after injury to vessel
    b. vessel collagen is exposed to blood triggering "activation" of plateles
    c. release of ADP from activated platelets causes platelet aggregation
    d. consolidation of platelet-plug by RBCs, coagulation factors, and formation of fibrin network
    e. thromboxane A2 (TX A2) is produced by platelets and endothelium promoting platelet aggregation and vasoconstriction

4. Coagulation Cascade
    a. a series of enzyme complexes located on the surface of platelets and endothelium which lead to thrombin production
    b. Thrombin (IIa) then converts Fibrinogen to Fibrin

Clinical Presentation

1.Clinically, symptoms depend on the area of cerebral circulation affected and on the extent to which it is affected.

    a. no characteristic clinical picture
    b. may range from a TIA to infarction of a major portion of the ipsilateral (on the same side) hemisphere
    c. if adequate intracranial collateral circulation is present, may see no signs or symptoms
    d. neurological symptoms

1. monoparesis to hemiparesis without a defect in vision
2. impairment of speech or language
3. transient monocular blindness

2. middle cerebral artery Occlusion
    a. most occlusions in the first portion of this artery are due to emboli and typically produce a neurological deficit

b. opportunity for collateral circulation is restricted to anastomotic blood flow from the anterior and posterior cerebral arteries on the surface of the brain

c. neurological symptoms

1. hemiplegia (paralysis of one side of the body)
2. hemisensory deficit
3. hemianopsia (blindness in 1/2 of the visual field)
4. aphasis (if infarct is in the dominant hemisphere)

3. Anterior Cerebral Artery Occlusion

a. Neurological symptoms:

1. weakness of the opposite leg with or without sensory involvement
2. apraxia (particularly of gait)
3. possible cognitive impairment

4. Vertebrobasilar system

a. Neurological symptoms

1. severe vertigo, nausea, vomiting, dysphagia, ipsilateral cerebellar ataxia
2. decreased pain and temperature discrimination
3. diplopia, visual field loss, gaze palsies

Risk Factors

1. Hypertension - most important risk factor for all stroke types; no defined BP indicating increased stroke risk, but risk increases proportionately as BP increases
2. Heart Disease
   a. CHF
   b. CAD
   c. AFiB
   d. Rheumatic Heart Disease
   e. LVH
3. TIAs, prior storke, carotid bruits
4. Increased hematocrit, increased fibrinogen

5. Sickle Cell Disease
6. Lifestyle Factors
    a. Age (older)
    b. Alcohol abuse
    c. Cigarette smoking
    d. Drug abuse
    e. Genetic factors
    f. Males
7. Diabetes Mellitus
8. Migraine HA's
9. Retinal emboli

Treatment of Cerebrovascular Disease

1. Eliminate of control risk factors
2. Education of patient regarding risk-factor reduction and signs and symptoms of TIAs and mild stroke.
3. Surgical Interventions
    a. Carotid Endarterectomy (CEA)
        1. surgical removal of the atheromatous plaque
        2. reserved for patients with an ulcerated lesion or clot that occludes ≥ 70% of blood flow in the carotid artery
        3. may decrease risk of stroke by 60% over the two years following the procedure
        4. vertebral endarterectomy no longer used

4. Endovascular procedures
    a. Balloon Angoplasty
        1. consists of placing a small deflated balloon in the stenosed vessel
        2. the balloon is then inflated pressing the atheromatous plaque against the wall
        3. has a risk of dislodging emboli that can be carried to the brain or retina
    b. Stent Placement

1. experimental procedure
2. consists of placing a stainless steel coil into the vessel which then sticks to wall of artery

5. Antiplatelet Agents
   a. Aspirin
      1. Mechanism of Action
         a. inhibition of platelet aggregation
         b. decreases release of vasoactive substances from platelets
         c. irreversible inactivation of platelet cyclooxygenase; effect lasts for the life of the platelet (5-7 days)
      2. Efficacy
         a. ASA has shown clinically significant reductions (22-24%) in stroke risk and death in randomized trials in patients (Secondary prevention)
         b. doses have ranged from 50 to 1500 mg/day
         c. more recent trials have evaluated lower doses (30 to 325 mg/day); results indicate that lower doses may be as beneficial with less adverse effects
         d. some studies suggest that ASA is more effective in men than in women
         e. role in primary prevention unclear
   b. Dipyridamole (Persantine)
      1. Mechanism of Action
         a. weak inhibitor of platelet aggregation
         b. inhibits platelet phosphodiesterase
      2. Efficacy
         a. clinical trials have not supported the use of dipyridamole in cerebral ischemia
         b. no additive effect found with aspirin

c. **Sulfinpyrazone (Anturane)**

1. Mechanism of Action
   a. reversible inhibition of cyclooxygenase
2. Efficacy
   a. clinical trials have not supported use

d. **Ticlopidine (Ticlid)**

1. Mechanism of Action
   a. inhibits ADP-induced platelet aggregation
   b. inhibits platelet aggregation induced by collagen, PAF, epinephrine and thrombin
   c. bleeding time prolonged
   d. minimal effect on cyclooxygenase
2. Efficacy
   a. has been shown to reduce the incidence of stroke by approximately 22% in patients who have experienced previous TIAs or stroke
   b. may be more effective than aspirin with less GI effects
   c. no gender difference seen with ticlopidine as with ASA
   d. dosed at 500 mg/day divided into 2 doses (250 mg PO BID)
   e. adverse effects:
      1. diarrhea
      2. rash
      3. increased total serum cholesterol (ratio of HDL:TChol unchanged)
      4. neutropenia occurred in 1-2% of patients; must monitor CBC every 2 weeks for the first 3 months of therapy

ASA has been proven to be beneficial in the secondary prevention of TIAs and in decreasing major cerebrovascular events and death; however, the correct dosage is still unknown.

The currently recommended dose of aspirin is 325-975 mg/day.

The role of aspirin in the primary prevention of TIAs and stroke is still unclear.

1. Ticlopidine has been proven to be effective in the secondary prevention of TIAs and stroke. Due to side effects and cost, it should be reserved for those patients who fail or cannot tolerate ASA.

6. Anticoagulation

a. **Warfarin**

1. no studies that prove the superiority of anticoagulants over antiplatelet agents
2. may reduce the risk of stroke in patients with a prior MI
3. may be useful in those patients who continue to be symptomatic despite antiplatelet therapy
4. the major exception is in patients with cerebral embolism of cardiac origin
   a. chronic anticoagulation with warfarin has been shown to prevent cerebrovascular events in patients with NVAF
   b. INR adjusted to between 2.0-3.0

a. most patients do not have impaired consciousness in the first 24 hours

b. if consciousness is impaired, suspect a stroke-related seizure, hemorrhage, hypoxia or increased intracranial pressure

2. Supportive care

a. Maintain adequate tissue oxygenation: May require airway support and ventilatory assistance. Check for possible aspiration pneumonia.

b. BP : In most cases, BP should not be lowered. If severe HTN, lower BP cautiously as neurological status may worsen when BP is lowered.

c. Volume status : Correct for hypovolemia and keep electrolytes in the normal range.

d. Fever : treat and look for source of fever.

e. Hypoglycemia/hyperglycemia : Keep under control. Hyperglycemia may worsen the ischemic injury.

f. DVT Prophylaxis : This is a must as stroke patients have a high risk for DVT! It is important to use either sc heparin 5,000 IU q. 8 or 12 hrs. or sc enoxaparin 30 mg q. 12 hrs. plus early ambulation!

3. Pharmacologic Therapy

a. Recombinant Tissure Plasminogen Activator (r-tPA)

Protocol - (For Select Patients Only!!)

1. efficacy is influenced by the length of time between the onset of the stroke and the initiation of treatment
2. rapid diagnosis and immediate administration of tPA increases its efficacy and may limit the potential for hemorrhagic conversion of ischemic stroke
3. Inclusion Criteria:
   a. ischemic stroke within 3 hours
   b. SBP < 185; DBP < 110
4. Exclusion Criteria:
   a. isolated neurological deficit
   b. another stroke or serious head injury within the previous 3 months
   c. INR > 1.7
   d. use of heparin in the prior 48 hours
   e. major surgery in prior 14 days
   f. platelet count < 100,000/mm^3
5. tPA dose
   a. 0.9 mg/kg body weight; max. dose 90 mg
   b. give 10% of the dose as a bolus over 1-2 minutes and the rest as a continuous infusion over 1 hour
   c. No antiplatelets or anticoagulants within 24 hours !!
6. Rsults :
   a. improved outcome with regard to disability and death that persists 3 months after therapy
   b. there is a higher incidence of intracerebral hemorrhage (6.4% vs. 0.6%)

b. **Intra-arterial Thrombolysis**

1. early clot lysis and recanalization in about 50% of the patients with intra-arterial streptokinase and urokinase
2. doing : 50-70 U/kg as a loading dose, followed by 10-25 U/Kg/hour; goal PTT 1.5-2.0 X control
3. may op to not use a loading dose in these patients
4. major concerns are conversion of an ischemic stroke into a hemorrhagic stroke secondary to heparin, bleeding and thrombocytopenia
5. careful selection of patients is important

d. Low Molecular Weight Heparin (LMWH)

1. Org 10172 has been studied in acute stroke patients
2. synthetic low-molecular-weight fraction of heparin
3. undergoing investigation is several clinical trials
4. less risk of hemorrhage (?) and thrombycytopenia (?)
5. cannot be recommended for treatment until the results of an ongoing multicenter study are reported.

c. Ancrod (Arvidn)

1. derived from the venom of the Malayan pit viper snake
2. enzyme that breaks down fibrinogen to a soluble ancrod-fibrin complex without allowing stabilization of fibrin (fibrin is not cross-linked)
3. may stimulate tPA activation from vascular endothelium
4. causes fibrinolysis soon after administration; low risk of hemorrhagic complications
5. dose : 0.5 U/kg in NS over 6 hours; administered for 7 days following stroke in the clinical trials; litrate to a fibrinogen level of 0.5-1.0 g/L
6. cannot recommend for use until further clinical trials are completed; role in therapy not yet established

4. **Investigational Therapies for Acute Ischemic Stroke**

a. Dextran Infusion

1. decreased blood viscosity by volume expansion
2. decreased platelet function
3. decreased blood interaction with endothelium

b. **Prostacyclin**

1. potent vasodilator and platelet suppressant
2. has fibrinolytic activity

c. **Calcium Channel Blockers**

1. may increase CBF by smooth muscle relaxation
2. may preserve neuronal function by preventing the calcium influx into neurons that occurs during ischemia
3. nimodipine 30 mg PO every 6 hours for 28 days used in clinical trials; nicardipine also evaluated
4. role in therapy not fully known at this time; seems to work best if initiated within 6-8 hours of symptom onset

d. Hemodilution

1. utilize albumin and fluids to decrease hematocrit to 30-35% which decreases blood viscosity
2. questionable role in therapy

e. 21- Aminosteroids (Tirilazad Mesylate-FREEDOX)

1. during ischemia, free radicals are formed which initiate lipid peroxidation
2. 21-aminosteroids are potent inhibitors of lipid peroxidation
3. doses up to 6.0 mg/kg/day divided into 4 doses IV x 5 days have been shown to be beneficial in clinical trials
4. role in therapy not yet defined; studies still ongoing

V. Hemorrhagic Stroke (SAH)

Subarachnoid hemorrhage occurs in approximately 26,000 North Amercans per year. Most patients range in age from 20-70 years old; however, SAH occurs most frequently in those who are 50-60 years old. The initial hemorrhage is fatal in 20-30% of patients and will ultimately be fatal in 50% of patients. SAH causes permanent neurological disability in 20-50% of survivors. Two-thirds of patients with successful aneurysm clipping never return to the same quality of life as before the SAH. Unlike other types of cerebrovascular diseases, the incidence of SAH has remained about the same for the last 20 years.

A. Pathology
   1. SAH occurs when blood is released into the subarachnoid space surrounding the brain and spinal cord.

B. Etiology
   1. trauma
   2. ruptured intracranial aneurysms (75-80%)
      a. Associated with disorders such as congenital weakening of blood vessels, bacterial or fungal infections and hypertension.
      b. The walls of the cerebral blood vessels become weak and an aneurysm forms
      c. Blood can leak out slowly if the vessel wall is fragile or rapidly if the aneurysm ruptures. The escape of blood into the subarachnoid space causes irritation and damage to brain tissue.

   3. arteriovenous malformation (AVM) (4-5%)
      a. An abnormal collection of blood vessels where arterial blood flows directly into draining veins.
   4. vasculities
   5. tumor
   6. anticoagulants
   7. coagulation disorders (ie. hemophilia)
   8. no known cause (14-22%)

C. **Risk Factors For SAH**

1. hypertension
2. cigarette smoking (3-10X greater risk than in nonsmokers)
3. oral contraceptive use/estrogen use
4. alcohol consumption (binge drinking)
5. pregnancy and parturition/straining exercises
6. drug abuse (cocaine)

D. Clinical Presentation

1. Symptoms
   a. severe headche - "the worst headache of my life"
   b. nausea and vomiting
   c. neck pain
   d. nuchal rigidity
   e. photophobia, diplopia
   f. seizures

2. Grading of the severity of SAH
   a. relates to the clinical status of the patient and to the outcome
   b. Hunt and Hess Scale frequently used in clinical practice
   c. Hunt and Hess Scale for Rating Severity of SAH
      1. Grade I - minor headache, minor neck stiffness
      2. Grade II - severe headche, severe neck stiffness, cranial nerve signs, photophobia
      3. Grade III - drowsiness, confusion, mild paresis, mild dysphagia
      4. Grade IV - stuporous, moderate to severe hemiparesis, dysphagia
      5. Grade V - coma, decerebrate rigidity, symptoms of actue midbrain syndrome

3. Diagnosis

a. Computed Tomography (CT Scan) - used to demonstrate the presence of blood in the subarachnoid space

b. Lumbar Punctue (LP) - look for bloody CSF that does not clear.

c. Angiography - used to establish the presence of an aneurysm and

1. Grade I - minor headache, minor neck stiffness
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3. Diagnosis

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b. Lumbar Puncture (L)_ - look for bloody CSF that does not clear

c. Angiography - used to establish the presence of an aneurysm and precisely locate it for surgery

E. **Complications And Treatment Measures in SAH**

1. Rebleeding

a. Usually occurs within 2 weeks of the SAH ; however the maximal frequency of rebleeding is in the first day after SAH.

b. Rebleeding within 2 days occurs in 20% of patients and is associated with 60-70% mortality.

c. The cause is usually due to rupture of the clot that surrounds the original hemorrhage site

d. Symptoms

1. sudden onset of severe headache
2. rapid rise in BP
3. decreased level of consciousness

e. Prevention of Rebleeding

2. Surgery
   a. Early surgery surgical intervention within 3 days of SAH. Eliminates the risk of rebleeding and removal of the clot may decrease the risk of delayed cerebral ischemia.
   b. Late surgery - intermention more than 3 days after SAH.

3. Antifibrinolytic Therapy (controversial)
   a. Aminocaproic acid (Amicar) - blocks activation of plasminogen to plasmin and inhibits the activity of plasmin on the fibrin clot.
   b. Dose : 5 grams IV bolus, followed by a continuous infusion of 1-2 gm/hour for 14-21 days.

2. Hydrocephalus
   a. May develop within 1 day or may be delayed for weeks after the initial hemorrhage. The risk of hydrocephalus is associated with the volume and location of blood within the subarachnoid space and ventricular system.
   b. Acute hydrocephalus occurs within 24 hours of the initial hemorrhage and causes a decreased level of consciousness and focal neurological deficits. Late hydrocephalus causes dementia, gait disturbances, and incontinence
   c. Treatment of Hydrocephalus

1. Surgery
   a. Surgery is the only treatment for hydrocephalus.
   b. A drain is placed to allow CSF to flow outward.

1. External Ventiricular Drain (EVD)
2. Intraventricular Shunt to the peritoneum (VPS)
3. Interventricular Shunt to the aorta (VAS)

3. Delayed Cerebral Ischemia (secondary to vasospasm)

a. Primary cause of permanent neurological deficits

b. Cerebral vasospasm develops in 20-40% of patients during the 2-3 weeks following a SAH and most commonly develops 5-12 days after the initial hemorrhage.

c. The cause is not well understood, however, it may result from compromised autoregulation causing portions of the brain to become ischemic. It may also result from vascoactive substances that are released from degrading red blood cells (epinephrine, serotonin, and oxyhemoglobin) which may cause arterial narrowing

d. Treatment of Delayed Cerebral Ischemia.

1. Volume expansion and induction of hypertension ("Triple H Therapy" - hydration, hypertension, hemodilution)

a. Volume expansion 0.9% NaCl and 3% serum albumin solutions are used. Endpoint is to maintain PAWP of 15-20 mmHg without causing pulmonary edema.

b. Induction of hypertension; Dopamine and norepinephrine are used to elevate BP. The goal is to elevate SBP to 200-230 mmHg and maintain it for 7 to 14 days.

2. Calcium Channel Blockers (Nimodipine and Nicardipine.

A. Mechanism of action

1. May improve clinical outcome by limiting fixed neurological deficits.

2. May inhabit the rapid influx of calcium into ischemic neurons and prevent calcium-induced damage.
3. May dilate penetrating blood vessels allowing blood to be shunted back to ischemic areas of the brain and re-establish some autoregulation of cerebral blood flow.

b. Dose

Nimodipine 60 mg PO/NGT every 4 hours for 21 days. Must be initiated within 3 days of SAH.

3. Angiography with Papaverine.
    a. Papaverine, a non-selective muscle relaxant, is injected intra-arterially directly at the site of vasospasm. It is still ....
4. Angioplasty
5. Seizures
    a. Occur in 5 to 15% of patients with SAH.
    b. Prevention of Seizures.
    1. Anticonvulsants
    a. Phenytoin is preferred acutely as there is an IV dosage from available and it has minimal effects on mental status.
    b. Dose
        1. Loading Dose : 15 - 20 mg/kg
        2. Maintenance Dose : 5 - 7 mg/kg day, based on side effects and serum concentrations.
    c. If patients do not experience a seizure, may discontinue the anticonvulsant after 3-12 months.
    d. Phenobarbitan and Valproic Acid are alternative agents.

Cases - Cerebrovascular disease/Neurosurgery

1.2 Rationale/Justification

Stroke is one of the for most causes of high morbidity and mortality for many nations of the world, posing a major socio-economic challenge in the occupational and neuro-rehabilitational programmes of the 'Stroke-Survivors in the USA alone. It has been estimated that a sum of 3261 million dollars is spent as direct cost for treatment, in addition to 4104 million dollars as indirect cost consequent on economic losses of stroke victims.[33]

Vascular disease of the brain is a major problem in modern neurology. This is because of its spreadness and high percentage of morbidity and mortality. Hypertension, atherosclerosis, aneurism, collagen vascular disease, leucaemia, syndrome haemorragic diatesis and disease of the major factors which have been leading to stroke. Stroke causes disturbance of the systemic cerebral haemo and liquor (CSF) circulation. Morpho functional changes in the brain effect the higher anatomic centers which is responsible for the neurohumerohormonal regulation of the visceral organs among them very frequently. Suffers cardiovascular system and its main junction heart.[2,15,17,18]

Clinical manifestation of the cerebrocardial syndrome was described by many scientists. Authors have focused the ECG changes in stroke mainly of arrhythmmies, conduction defects, ischemic changes and mayocardial infarction.[14,17,31]

However, in the eliteratures, though they are scorce, show that very few work was done in terms of disturbance of the heart with view of types and phases of stroke and localization and dimension of lesion.[15,17,19,31] Morphology and function of the heart were not evaluated during acute and rehabilitation phase of stroke by most of the authors. There is not yet found of any correlation between the appreances of different clinical cardic findings with different cerebrovascular disturbances.[15] Hence, there is no prognostic criteria of cerebrocardial syndrome. Other data related to stroke are not available in Nepal due to either such studies have not done or, if any, one kept personally and not disseminated to others. One of the data analysed in the TUTH on stroke among 291 patients with stroke 40

were below the age of 40 years. This idicates that the young age of economically active period has been in stroke problems.[31]

Cerebrovascular disease (CVD) includes all disorders in which an area of the brain is transiently or permanently affected by ischemia or bleeding and one or more of the cerebral blood vessels are involved in the pathological process.

CVD is the third leading cause of death after heart disease and malignancy and it is estimated that an average of 500,000 new strokes will occur each year in the USA, CVD in the most disabling of all neurologic diseases. Approximately 50 percent of survivors have a resideual neurologic deficit and greater than 25 percent require chronic care.[32]

In western countries hypertension, heart disease, increased haemotocrit, increased fibrinogen, TIAs, prior, stroke, carotid bruits, sickle cell disease, old age, alcohol, cigratte, smoking, drug abuse, genetic factors, diabetics mellitus, migraine, retinal, emboili are the major risk-factors of stroke.[24,25,26,27]

The most common variety of complete strokes is atherothrombotic brain infaction which accounts for 61 percent of all strokes (excluding TIAS, the next most common is cerebral embolus (24 percent).[11,17,18,25,31] Arterial fibrillation is an independent risk factor for stroke and is associated with as many as 24 percent of all the ischemic strokes dynamic ECG monitoring, echocardiographic study and computet tomography of the head is essential to know the type of stroke.[20,25,29,32]

One of the 5 years retrospective study of the stroke patients admitted in TUTH[24] showed that hypetension (42 percent). Smoking 28.5 percent, alcoholizon 18.4 percent and diabetes mellitus was 10.8 percent as a risk factor. No single work has been done critically analysed on the main risk factors for stroke in Nepalese population; as Institute of Medicine has storted specialised neuro-services, it has become a prime concern of making a protocol on stroke prevention and management.

2. Objectives of the study were

- to detect the prevalence of stroke in villages and communities in Mechi Nagar Nagarpalika (Town Municipality), Jhapa, Nepal
- to find out the pattern of cardiac disturbances according to the localization and diameter of the lesion
- to identify the types of stroke and its associated factors through clinical examinations in the community
- to explore and identify the cause, risk factors, and effect of /from stroke in their daily socio-economic and cultural life
- to counsel and educate the attendants of stroke cases in the clinic on its prevention and rehabilitation mechanisms
- to recommend possible interventions, referrals and other programme for future projects

3. Methodology

3.1 Design: This study is quantitative and qualitative both. It is quantitative because the interview with the 2988 household heads of 14849 population was taken whether they had the signs, symptoms, problems of stroke and stroke related diseases or disabilities. Of the total, 14839 population 114 persons (3.8 percent of the total households and 0.8 percent of the population) found stroke and qualitative information were taken by examining clinically through health camps and regular survey with questionnaire.

3.2 Sampling: Mechi Nagar Town Municipality was chosen purposively due to the equally participated by the Municipality providing research assistants for survey, organizing health camps several times at their own cost. Mayor, Deputy Mayor, Ward Chiefs, Chairman and members of the Mechi Udyog Banijya Sangh, Jhapa were highly positive to enhance the study.

Sample Population was universe i.e. all the households and its total population were taken in the study. Unfortunately ward 5 of the Municipality was excluded due to the lack of time, budget and manpower.

3.3 Process: Orientation related to the interview with questionnaire, blood pressure check ups were given to 30 research assistants where AHW and HA with the Medical Doctor as a supervisor were appointed and oriented. PI and Co PI visited field time to time and fully participated in health camps at Kakarvitta, Dhulabari Chamber of Commers and Health Centre and total eight camps were organized where total 10,000 clients had visited for their examination and they were provided medicines through this project, Town Municipality and Chamber of Commerce's budget jointly.

All households were visited for taking interview. Those who were found stroke and its related factors and suffering were arranged time for clinical examination in health centre, private clinic and common schools with free of cost for the cases.

The health camps were assisted by 13 doctors (MD-Neurology, MDs, MDGP, DCH, DGO, MBBS-MPH, Nursing Supervisors, Staff Nurse, Pharmacists, HA, AHW, MCHW, TBA, FCHW and traditional healers, Medical Anthropologists, Local Political and Social leaders, Community people, staff of the concern agencies/officials etc.

3.4 Instruments: The instruments used for the study were questionnaire, clinical equipments such as stethoscope, BP instruments, Thermometer, ECG machine, Weighing machine, nutrition chart, tongue - depressor, audio scope, ENT diagnostic set, medicines, injections, stationeries, and so on.

4. Findings and Discussions

4.1 Family Structure:

The family size and households in Mechi Nagar Nagar Palika of the interviewed households is given below. The average family size is 5 persons per households, which is 4.6 in the district in 2001 according to Central Bureau of Statistics, HMG. The greater number of the family members is in ward 8 and the least in ward 3 of the Municipality. (Table: 1).

Table:1 Family Size and households in Mechi Nagar Nagar Palika

Ward No.	Name of the Wards	Family Member	Total Households	Average
1.	Khayardangi, Dhulabari	1348	282	5.0
2.	Glabari, Tarabari	1294	248	5.2
3.	Nagardubba, Tikapur	558	130	4.3
4.	Mawurmadi Jhora	1055	225	4.7
5.	NA	-	-	-
6.	Khuttidangi, Thoplebiran	1159	225	5.2
7.	Girigaun	1574	290	5.4
8.	Dhaijan, Ghailadubba, Surendra Nagar	1854	338	5.5
9.	Surya Tole, Deepnagar, Pragati	533	113	4.7
10.	Burmeli Tole, Sangam Tole	1650	344	4.8
11.	Pyori Bhitta, Paliya	1415	295	4.8
12.	Ittabhatta, Aiyabari	1452	292	5.0
13.	Mechidada, Ittabhatta	947	206	4.6
Total		**14839**	**2988**	5.00

Source: Field work.

The above table indicates that the family size is heterogeneous and the structure of the family indicates the need of attention on the awareness to form the nuclear family type.

4.2 Population by sex

Of the total 14,839 populations that were interviewed regarding the stroke related problems in 12 wards of Mechi Nagar Nagar Palika, Jhapa found to be 52 percent (7621male) male where as 48 percent (7218 women) women. Male female ratio found to be 0.95:1. Except in ward number 2, all the wards have higher percent of the males than the females. The ward number 3 has the highest male populations i.e. 58 percent of the male populations.

Table: 2 Population by sex

Ward No.	Total	Male (%)		Female (%)		Total (%)
1	1348	674	50.00	674	50.00	100.00
2	1298	634	49.00	660	49.00	100.00
3	558	324	58.00	234	58.00	100.00
4	1055	548	52.00	507	52.00	100.00
5	-	-		-		-
6	1159	614	53.00	545	53.00	100.00
7	1579	787	50.00	787	50.00	100.00
8	1854	964	52.00	890	52.00	100.00
9	533	272	51.00	261	51.00	100.00
10	1650	858	52.00	792	52.00	100.00
11	1415	708	50.00	707	50.00	100.00
12	1452	755	52.00	697	52.00	100.00
13	947	483	51.00	464	51.00	100.00
	14839	**7621**	**52.00**	**7218**	**48.00**	**100.00**

Sauce: Fieldwork.

4.3 Population by age group

The population by age group found more of the 15-24 (23.6 percent) years followed by 5-14 (23.5 percent) years, 25-34 (17.0 percent) years, 0-4 (8.7 percent) years, 45-54 (7.4 percent) years, 55-64 (4.5 percent) years and 65 above(3.1 percent) years (Table: 3)

Table: 3 Population by age

		Age Group							
Ward No.	Total	0 - 4	5-14	15-24	25-34	35-44	45-54	55-64	65+
1	1348	134	312	367	242	132	88	42	31
2	1294	125	311	264	248	149	103	49	45
3	558	48	108	138	96	95	28	31	14
4	1055	70	285	232	180	150	65	53	20
5	-	-	-	-	-	-	-	-	-
6	1159	91	262	294	184	145	81	66	36
7	1574	162	331	370	272	209	91	65	74
8	1854	160	439	482	285	184	154	86	64
9	533	33	124	134	92	73	45	15	17
10	1650	128	402	373	297	195	107	90	58
11	1415	147	347	285	238	206	110	53	29
12	1452	113	330	336	247	181	136	67	42
13	947	76	230	224	139	121	84	46	27
	14839	**1287**	**3481**	**3499**	**2520**	**1840**	**1092**	**663**	**457**

Source: Fieldwork.

The above table suggest that economically active population is in greater percentage followed by school going and dependent population (0-14 and above 65 years population). This means people in this Town Municipality are active to work and earning good due to their age group.

4.4 Population by marital status

The interviewed households have the population with 51.5 percent unmarried, 45.1 percent married, 3.0 percent widow/widower and 0.4 percent separated and living alone. The distribution of the married and unmarried populations by wards is no such differences but the widow/widower and separated population has a difference by number and percent (Table:4).

Table :4 Population by Marital Status

S.N.	Ward No	Total	Marital Status								
			Unmarried (%)		Married (%)		Widower (%)		Seperated (%)		Total
1	1	1348	701	52.00	617	45.80	27	2.00	3	0.20	100%
2	2	1294	634	49.00	608	47.00	52	4.00	-	-	100.00
3	3	558	296	53.00	257	46.00	5	1.00	-	-	100.00
4	4	1055	570	54.00	449	42.6	32	3.00	4	0.40	100.00
5	5	-	-	-	-	-	-	-	-	-	-
6	6	1159	602	52.00	522	45.00	35	3.00	-	-	100.00
7	7	1574	787	50.00	708	45.00	63	4.00	16	1.00	100.00
8	8	1854	945	51.00	849	45.80	56	3.00	4	0.20	100.00
9	9	533	272	51.00	244	45.80	16	3.00	1	0.20	100.00
10	10	1650	835	50.60	742	45.00	66	4.00	7	0.40	100.00
11	11	1415	743	52.5	637	45.00	32	2.30	3	0.20	100.00
12	12	1452	755	52.00	624	43.00	58	4.00	15	1.00	100.00
13	13	947	483	51.00	636	46.00	19	2.00	9	1.00	100.00
		14.839	7623	51.5	6693	45.1	461	3.0	62	0.4	100

Source : Field work.

The widow/widower and the separated families and persons are backed by other family members and have been lived with their own labouring as well as assisted by the kin groups. The elderly persons who are separated and or are Widow/ widower have their property like land, animals and other private properties. Very few have not even a little of their own property and should have to solely depended with other kin groups.

4.5 Population by Profession

The population of the interviewed households in the municipality, the majority are dependent (39.0 percent) followed by engaged in agriculture (25.4 percent), doing labouring (17.2 percent), student (13.6 percent), business (4.6 percent) and service (0.1 percent) (Table:5).

Table: 5 Population by Occupation

Wards	Total	Depnd *	%	Study	%	Agri &	%	Busi @	%	Labo #	%	Serv$	%
1	1348	619	45.90	270	20.00	135	10.00	148	11.00	175	13.00	1	0.0
2	1294	569	44.00	259	20.00	129	10.00	117	9.00	207	16.00	13	1.0
3	558	335	60.00	11	2.00	22	4.00	67	12.00	123	22.00	-	-
4	1055	760	72.00	10	1.00	169	16.00	11	1.00	104	9.90	1	0.1
5	-	-	-	-	-	-	-	-	-	-	-	-	-
6	1159	417	36.00	12	1.00	475	41.00	35	3.00	220	19.00	-	-
7	1574	173	11.00	472	30.00	834	53.00	16	1.00	79	5.00	-	-
8	1854	501	27.00	19	1.00	1149	62.00	37	2.00	148	8.00	-	-
9	533	69	13.00	144	27.00	229	43.00	-	-	91	17.00	-	-
10	1650	313	19.00	479	29.00	445	27.00	66	4.00	347	21.00	-	-
11	1415	877	62.00	3	0.20	110	7.80	57	4.00	368	26.00	-	-
12	1452	465	32.00	349	24.00	232	16.00	87	6.00	319	22.00	-	-
13	947	436	46.00	76	8.00	142	15.00	38	4.00	255	27.00	-	-
Tot.	14839	5534	39.0	2104	13.6	4071	25.4	679	4.6	2436	17.2	15	0.1

Note: *= Dependent
&= Agriculture
@= Business
#= Labouring
$= Service

Source : Field work.

The above table indicates that 39 percent dependents are served by the 61 percent population and which means no such poverty problem have existed if they have the working opportunity. The 17.2 percent population are engaged in labouring and it is because the Municipality is in the border of India and Nepal so that people here could do labouring for carrying goods for markets and have sufficient labouring opportunities created by boarder, by Municipality, market, transportations and small businessmen.

4.6 Population by Education

Of the total population, 17.1 percent male and 21.3 percent female population and total 38.2 percent population is illiterate and remaining are literate and educated. Of the total population, higher education represent the least, and than SLC and primary education respectively. Female literacy is less than male in general and in some wards the male literacy is lesser than female (Table: 6)

Table : 6 Population by Education

		Illiterate				Primary				SLC				Higher				Total			
Wa	Total	Mal	%	Fem	%	Mal	%	Fem	%	Mal	%	Fem	%	Mal	%	Fem	%	Mal	%	Fem	%
1	1348	202	15.0	310	23.0	148	11.0	216	16.0	135	10.0	121	9.0	121	9.0	94	7.0	607	45.0	741	55..0
2	1294	207	16.0	272	21.0	194	15.0	207	16.0	91	7.0	90	7.0	142	11.0	91	7.0	634	49.0	660	51.0
3	558	73	13.0	89	16.0	106	19.0	95	17.0	56	10.0	50	9.0	50	9.0	39	7.0	285	51.0	273	49.0
4	1055	179	17.0	211	20.0	200	19.0	211	20.0	106	10.0	95	9.0	32	3.0	21	2.0	517	49.0	538	51.0
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	1159	255	22.0	266	23.0	162	14.0	115	13.0	116	10.0	93	8.0	81	7.0	35	3.0	614	53.0	545	47.0
7	1574	220	14.0	299	19.0	393	25.0	331	21.0	157	10.0	63	4.0	79	5.0	32	2.0	850	54.0	724	46.0
8	1854	260	14.0	357	19.0	408	22.0	371	20.0	204	11.0	148	8.0	74	4.0	37	2.0	946	51.0	908	49.0
9	533	102	19.0	112	21.0	80	15.0	91	17.0	53	10.0	53	10.0	21	4.0	21	4.0	256	48.0	277	52.0
10	1650	198	12.0	281	17.0	264	16.0	214	13.0	248	15.0	231	14.0	148	9.0	66	4.0	858	52.0	792	49.0
11	1415	410	29.0	410	29.0	241	17.0	212	15.0	71	5.0	43	3.0	14	1.0	14	1.0	736	52.0	679	48.0
12	1452	174	12.0	290	20.0	349	24.0	232	16.0	160	10.0	102	8.0	102	7.0	43	4.0	784	54.0	668	46.0
13	947	227	24.0	265	28.0	170	18.0	133	14.0	66	7.0	57	6.0	19	2.0	10	1.0	483	51.0	464	49.0
Tot	**14839**	**250**	**17.5**	**315**	**21.5**	**271**	**18.0**	**246**	**16.0**	**146**	**10.0**	**1146**	**6.0**	**883**	**6.0**	**503**	**4.0**	757	**51.0**	726	**49.0**

Source : Field work.

The literacy and educational status is high than the national rate in this Municipality. The literacy rate is higher because the Municipality has number of primary and high schools of both private and government. Besides the schools, there are other non-formal literacy classes conducted by NGOs and other institutions initiated by the Municipality. Most of the political leaders of the Municipality are graduates and post graduates who have initiated the educational programmes and thus, the illiteracy rate is reducing year by year.

4.7 Population by Stroke problems

Of the total 2988 households, 114 (3.8 percent) and of the total 14839 population 114 (0.8 percent) persons have the problems related to the Stroke (Table:7).

Table: 7 Population by Stroke

Stroke	Yes	No	Total
Persons/household	114	2874	2988
Percent	3.8	96.2	100.0

Source : Field work

4.8 Problems of stroke by its type

Of the total 114 stroke related problems, 91 persons (79.8 percent) has stroke related different problems followed by 13 (11.8 percent) handicapped of different organs and parts of the body and 10 (8.8 percent) has strokes (Table:8). Of the total cases, majority (32 percent) is below than 19 years of age followed by 30-39 years (16.0 percent), 40-49 years (15 percent) 20-29 years (14.0 percent), 60-69 years (10.0 percent) and remaining others have below than 8.0 percent (Table:8).

Table : 8 Problems on Stroke of the Respondents

S.N.	Problems	Total	
1	Stroke	10 (8.8%)	
2	Handicapped	13 (11.4%)	
3.	Other associated problems	91 (79.8%)	
	Total	114 (100.0)	
	Age Group	**Respondents**	**%**
1	Below 19 years	6	5
2	20 – 29	11	10
3	30 – 39	9	8
4	40 – 49	16	14
5	50 – 59	17	15
6	60 – 69	37	32
7	70 +	18	16
Total		114	100.0

Source : Field work.

This table shows that 42 (36 percent) of the patient with stroke were under the age of 50 and possible cause of stroke would be cardiogenic were as 72 (63 percent) of the patient might had atherothrombotic or haemorrhagic type of stroke.

4.9 Symptoms of the cases

There are multiple symptoms of the persons who have the stroke problems and they are duplicated that one person has more than one problems and symptoms. Of the total 114 stroke cases, 43.9 percent has weakness followed by tingling sensation (*Jham-jham)* (38.6 percent), headache (26.3 percent), unconsciousness and or fainting (4.4 percent), epilepsy and deafness with blindness (3.5 percent each) and below 1 percent has of the swelling face, low body movement, problem on leg and feet and 25.4 percent has the other general problems (Table: 9).

Table : 9 Symptom of the problems/What had happened

S.N.	Problems	Respondents	(%)
1	Headache	30	26.3
2	Weakness	50	43.9
3	Tingling sensation / *Jhum-jhum*	44	38.6
4	Others : Swelling face	1	0.9
	Fainted	5	4.4
	Low body movement	1	0.9
	One Part Paralysis	5	4.4
	Leg problem	1	0.9
	Epilepsy	4	3.5
	Handicap	1	0.9
	Deafness Blindness	4	3.5
	Others	29	25.4
	Total :	175*	

*= By Duplication

Source : Field work.

The above table indicates that one person has been suffering from more than one problems and is seeking health cares from different sources.

4.10 History of illness

The history of the problems mentioned above (Table: 9) found to be since more than two years (62.3) followed by within one years (14.9 percent), since birth (2.6 percent) and 1-2 years (0.9 percent). 22 persons did not response due to their negligence and some are deaf and some have forgotten since when they had the onset of the illness (Table: 10).

Table : 10 History of Stroke / From when the Symptom Appear

S.N.	Duration	Respondents	(%)
1.	Since birth (Cerebral palsy)	3	2.6
2.	Within one year	17	14.9
3.	1 - 2 year	1	0.9
4.	More than 2 years	71	62.3
5.	No response	22	19.3
	Total :	114	100.0

Source : Field work.

4.11 Suffering periods from the illness

Those who have the illness related to stroke have been suffering for more than a year (50.9 percent) followed by one month (6.1 percent) where as 43.0 percent do not remember that how long they have been suffered (Table:11).

Table: 11 Duration of suffering from the problems

S.N.	Duration	Respondents	(%)
1.	One day	-	-
2.	One week	-	-
3.	One month	7	6.1
4.	One year and more	58	50.9
5.	Do not remember	49	43.0
	Total :	114	100.0

Source: Fieldwork.

The above table indicates that majority are in chronic position of the stroke related illness suffering from long-term pain. Those who do not remember the lenth of time of the pain might not have the severe problem.

4.12 Medication Practices

For the problems from which the people are suffering are in medication practices. One person has been associated with one or more than one treatment either contacting to the institution or taking medicines (allopathic, ethno-medicine and using traditional healers) at a time or changing the medications from one to another and others. Of the total 114 ill persons, they had contacted 173 sorts of institutions for their medications. Of them, 58 percent had contacted traditional (shaman) healers followed by visiting local health institutions (SHP HC) (42.0 percent), self-medications (taking medicines from their kit bag, buying medicines from pharmacy, following the use of medicines from others who had the similar sorts of problems, medicines used with out consultation with the duly qualified medical practitioners, using herbal medicines, using ash or other materials, etc. 21.0 percent), consulting to government hospital (14.0 percent), private health institutions (10.0 percent) and medication from pharmacy, relatives and friends (Table:12)

Table: 12 Medication sought for the problems

S.N.	Medication from	Respondents	(%)
1.	Shaman healers	66	58.0
2.	Self-medication	24	21.0
3.	Local health Institution (SHP HC)	48	42.0
4.	Nursing home	2	2.0
5.	Govt. Hospital	16	14.0
6.	Private NGO Hospital	11	10.0
7.	Pharmacy	1	1.0
8.	Others (relatives, friends)	5	4.0
	Total :	173*	152.0

* Multiple responses. Source: Field work.

This table indicates that the people are aware on their health so that they have consulted different health care systems and practices. No persons having illness related to stroke lived without the medications be whatever that are (allopathic, traditional, self or other). 173 consultations from 114 persons mean they practice to have medication, which is positive for the promotion of the health of them.

4.13 Pain condition

Of the total 114 ill persons 49.1 percent do not feel pain followed by severe pain (26.3 percent), moderate and irregular pain (7.9 percent each), slowly (7.0 percent) and continuous and deep pain (0.9 percent each) (Table:13).

Table : 13 Pain from Stroke

S.N.	Pain	Respondents	(%)
1.	Severe	30	26.3
2.	Moderate	9	7.9
3.	Slowly	8	7.0
4.	Continuous	1	0.9
5.	Deep pain	1	0.9
6.	Pain irregularly	9	7.9
7.	Do not feel pain	56	49.1
	Total :	114	100.0

Source : Field work.

4.14 Complains of the stroke patients

Of the total 58 ill persons with pain (various types), 130 sorts of effects have felt from pain. It is due to more than one effects that the ill persons have experienced. 36 percent experienced severe tingling sensation to the affected limbs or face (*Jham-jham*), followed by severe weakness (35.0 percent), severe headache (28.0 percent), difficult to sleep (13.0 percent) and remaining less than 2 percent (Table: 14).

Table : 14 Complains

S.N.	Effect	Respondents	(%)
1.	Headache	28	28.0
2.	Weakness of the limbs	40	35.0
3.	Tingling sensation (*Jham-jham*)	41	36.0
4.	Others: Appetite	1	1.0
	Throat pain	1	1.0
	Body pain	1	1.0
	Weak in Walking	2	2.0
	Giddiness	1	1.0
	Fainting	2	2.0
	Difficult to sleep	15	13.0
	Total	130*	117.0%

* Multiple problems/responses Source : Field work.

4.15 Causes of stroke in people's opinion

The opinion provided by the ill people on the causes that they feel for the stroke problem is found heterogeneous. 75.4 percent people do not know the cause of it and 12.3 percent said the cause as personal habits, 2.6 percent each said the cause as falling down on the floor and malnutrition, 1.8 percent each said as disturbance in neurological and in nerve and wondering evil spirits and very few that is below one percent said the causes as ear discharge, fractures, thunder sound and genetic one (Table:15).

Table : 15 Opinion of the respondents on the cause of the stroke problem

S.N.	Opinion on cause	Respondents	(%)
1.	Neuro related/Nerve itself	2	1.8
2.	Fall down on the floor	3	2.6
3.	Ear discharge (*Kan pakeko*)	1	0.9
4.	Fractures (*Bancchiyeko*)	1	0.9
5.	Sound of Thurder (*Chhatyangko Aawaz*)	1	0.9
6.	Genetics (*Bansanu*)	1	0.9
7.	Spirits (*Jangali*)	2	1.8
8.	Malnutrition	3	2.6
9.	Personal habits	14	12.3
10.	Don't know	86	75.4
	Total	114	100.01

Source : Field work.

4.16 Cardiological problems

The respondents were asked about their heart problems and 8.8 percent had the heart problem and 91.2 percent didn't know (Table:16).

Table : 16 Problems on heart

S.N.	Heart problems	Respondents	(%)
1.	Yes	10	8.8
2.	Don't know	104	91.2
	Total :	114	100.0

Source : Field work.

4.16.1 Symptoms experienced during heart problem

The 10 persons had the heart problem and had experienced more than one symptoms while had heart problem. Of them all had chest pain, 8 respondents had short breathing and pain in cold temperature and 4 had pain while working or in the job (Table:16.1). The duration of the problems of the symptoms mentioned in Table 16.1 was 1-5 minutes, whole day and more than one week to one person each, and 6-10 minutes to 2 persons (Table:16.2).

Table : 16.1 If yes : Problems faced by the respondents

S.N.	Breath	Respondents
1.	Short breathing on job	8
	on rest	6
2.	Chest pain	10
3.	Pain in cold temperature	8
4.	Pain while working / job	4

Table : 16.2 Duration of the above Symptoms

S.N.	Duration of Symptoms	Respondents
1.	Less than one minute	-
2.	1 - 5 minutes	1
3.	6 - 10 minutes	2
4.	Whole day	1
5.	One week	-
6.	More than one week	1

4.17 Medication for heart problem

Of the total 10 heart problem cases 5 experienced the symptoms and only 2 consulted for medication one each had consulted to doctor and traditional healers respectively (Table:17).

Table :17 Treatment / Medication for the above problem

S.N.	Medication	Respondents
1.	Consulted to doctors	1
2.	Consulted to Health Post	-
3.	Consulted to Shaman Healers	1
4.	Nothing	3

17.1 Electrocardiogram

Respondents	Normal	Abnormal
114	42 (36.8 percent)	72 (63.2 percent)

Source : Field work.

Above table shows that 72 (63.2 percent) patients had found abnormal E.C.G. where as 36.8 percent had normal.

4.18 Hypertension

Of the total 114 stroke related cases 80 (70.1 percent) had hypertension and 34 (29.9% percent) hadn't (Table:18). Blood pressure was measured 3 times in 5 minutes gap.

Table :18 Hypertension / High blood pressure of the Respondents

S.N.	High BP	Respondents	(%)
1.	Yes	80	70.1
2.	No	34	29.9
	Total	114	100.0

Table no. 18 shows that 70% of the stroke patient suffered from hypertension.

Source : Field work.

4.19 Description of Blood Pressure

Table : 19 Description of Pulse

S.N.	Age group	Total number of respondents 114	Irregular pulse of the respondents	Regular
1.	Below 19 years	6	3	
2.	20 - 29	11	5	
3.	30 - 39	9	2	
4.	40 - 49	16	7	
5.	50 - 59	17	2	
6.	60 - 69	37	5	
7.	70 +	18	3	
	Total :	114	27	

Source : Field work.

This result shows that 27 patient had irregular pulse among them 17 (62.9 percent) irregular pulse was found upto 49 years of age. While analysing only the irregularity of the pulse and stroke one can assume that these patients may had thromboembolic stroke (62.9 percent).

4.20 Diabetes

Of the total 114 cases only 14 persons (12.2 percent) has the diabetes problem (Table:20).Of them the diabetes had appeared since within one year (8 persons) and 6 had since more than one year (Table:20.1) The problem was identified sugar test.

Table: 20 Diabetes among the Respondents

S.N.	Diabetes	Respondents	(%)
1.	Yes	14	12.2
2.	No	100	87.8
	Total :	114	100.0

This table shows that 14 (12.2 percent) had suffered from diabetes mellitus.

Table : 20.1 If yes, from when it appeared

S.N.	Diabeties	Respondents
1.	Within one year	8
2.	More than one year	6

Table: 20.2 How did you know it ?

S.N.	Diabeties	Respondents
1.	Sugar test	10
2.	High frequency of urinating	4

Source : Field work.

4.21 Diabetes status

Table : 21 Diabetes Status

S.N.	Diabetes	Status (mean value)	Respondents
1.	**Blood Sugar**		
	i. Empty stomach	140	375
	ii. After meal	182	160
2.	**Urine**		
	i. Sugar	140	3
	ii. Albumin	200	5
	iii. Keton Acitone	-	9

4.22 Diabetes among family members

Of the total 5 diabetes cases 2 families had diabetes with their mother (Table:22). It was seen to their mothers since a long back.

Table : 22 Diabetes among family members

S.N.	Whom	Respondents
1.	Mother	2

Source : Field work.

4.23 Financial arrangement for treatment

Those who have diabetes (5 persons) had treated with the finance which was deposited by them (2 persons) and the 3 had arranged through loan from others (Table: 23).

Table : 23 Financial arrangement for treatment

S.N.	Arrangement	Respondents
1.	Self deposit	2
2.	Donation / Help from other	-
3.	Credit / Loan	3
	Total	5

Source : Field work.

4.24 Recovery status from treatment

The diabetes patients till now are under treatment and have not cure well (Table: 24).

Table: 24 Recovery from the treatment

S.N.	Recovery	Respondents
1.	Yes	-
2.	No but continuing treatment yet	5

Source : Field work.

4.25 Epilepsy status

Of the total 114 ill persons 2 persons (1.8 percent) has epilepsy in the study area (Table: 25) and both of them have less than one-hour effect from epilepsy, the frequency of epilepsy is sometimes but not always and both of them are under medication/treatment (Table: 25).

Table: 25 Description of Epilepsy in Family

S.N.	Epilepsy	Respondents	(%)
1.	Yes	2	1.8
2.	No	112	98.2
	Total	114	100.0
3.	How long: Less than hour	2	100
	More than hour	-	-
4.	How many times a day		
	2 time	-	-
	3 time	-	-
	More than 4 times	-	-
	Not always but sometimes	2	100
5.	Treatment		
	Yes	-	-
	No	-	-
	Continuing	2	100

Source : Field work.

4.26 Paralysis Status

Of the total 114 ill people, 56 persons (49.1 percent) has paralysis (Table: 26). Of the 56 paralysis cases, they have 61 problems that is more than one problem of a person. The paralysed organs and parts are leg, deafness, hand, dumbness, eye, muscles, whole body, below waist (belt area), finger of leg and other parts of the body (Table: 26.1).

Table : 26 Paralysis situation of the respondents and families

S.N.	Paralysis	Respondents	(%)
1.	Yes	56	49.1
2.	No	58	50.9
	Total :	114	100.0

Table: 26.1 If yes which part of the body

S.N.	Part of Body	Respondents	(%)
1.	Right part of the body		
2.	Left part of body		
3.	Leg - Right	8	8.0
	Left	10	10.0
4.	Ear/deafness - Single/both	7	7.0
5	Hand : Right	8	8.0
	Left	11	11.0
6.	Dumb	3	3.0
7.	Eye – Right	3	3.0
	Left	4	4.0
8.	Muscles	2	2.0
9.	Whole body	1	1.0
10.	Below belt	1	1.0
11.	Leg finger	2	2.0
12.	Difficult to move of head	1	1.0

Source : Field work.

4.27 Symptoms of paralysis

Table : 27 Clinical Presentation

S.N.	Symptoms	Respondents
1.	Difficulty in walking	1
2.	Difficult in Speaking	1
3.	Unable to stand	6
4.	Abscess	1
5	Burn	2
6.	Sound of the thunder	1
7.	Pain in the arms	1
8.	Back pain	1
9.	Pain in the calf muscles	1
10.	Unconsciousness	3
11.	Tingling sensation	3
12.	From the birth	3
13.	Fever	1
14.	Self emerged	1
15.	Measles	1
16.	Fainting attack	1
17.	Tingling sensation	5
18.	Loss of speech	2
19.	Pain during walking	3
20.	Disturbance of sleep	3
21.	Illness	1
22.	Atrophy of the legs	2
23.	Unable to move the body	12
	Total	56

Source : Field work.

4.27.1 Develpoment

	27.1 How it developed :	From when
1.	Stand with support	Below one year - 26
2.	Slowly	More than one year - 30
3.	Difficulty in hearing	
4.	Gradual onset of pain in the legs	
5.	For five years	
6.	Blood in the eye	
7.	Appearance of wound	
8.	Severe illness	
9.	Self	
10.	Without medication	
11.	Atropy of the legs	
12.	Fainting attacks	
13.	Facial weakness	

4.27.2 History

27.2 History of Paralysis

1. Suruma Ladera Thookiyeko Tyaspachhi Khutta Chalena
2. Janma Siddha
3. Jangaliko Karanbata (Evil spirit)
4. Pahila Thik Thiyo
5. Jwaro, Jhada, Pakhala
6. Ringata Lagne ra Ladne
7. Raksi Pieune Garda
8. Shaaria Lulo Hunu

4.27.3 Medications for paralysis

Of the total 56 paralysis cases, 34 (60.7 percent) treated through health institutions followed by traditional healers 11 persons (19.6 percent), self treated 5 persons (8.9 percent), ethno-medicine by 3 persons (5.4 percent) and 2 persons (3.6 percent) treated by private practitioner medical doctor and 1 has not yet treated (Table: 27.3).

Table: 27.3 Medication done

S.N.	Medication done	Respondents	(%)
1.	Self-treated	5	8.9
2.	Shaman healers	11	19.6
3.	Health Institutions	34	60.7
4.	Others :		
	a. Ethno-medicine	3	5.4
	b. Doctor	2	3.6
5.	No treatment yet	1	1.8
	Total	56	100.0

4.28 Treatment costs

The treatment costs vary between the persons depending on the economic status of them. 60.7 percent of the total persons with paralysis problem has invested for their treatment in a range of more than 1,000.00 Nepalese Rupees followed by Rs. Upto 100.00 (19.6 percent), Rs. 100.00 to 500.00 by 17.9 percent and 1.8 percent invested for treatment Rs. 500.00 to 1,000.00 (Table: 28). The sources of financial arrangements were loan and credit 46.4 percent followed by self-deposit (44.6 percent) and donations from others (8.9 percent) (Table: 28.1).

Table : 28 Expenditure for the treatment of Paralysis

S.N.	Expenditure (Rs)	Respondents	(%)
1.	Upto Rs. 100	11	19.6
2.	100 – 500	10	17.9
3.	500 – 1000	1	1.8
4.	More than 1000	34	60.7
5.	Total	56	100.0

Table: 28.1 Sources of expenditure

S.N.	Source of expenditure	Respondents	(%)
1.	Self-deposit	25	44.6
2.	Donation/help from others	5	8.9
3.	Loan/Credit	26	46.4
	Total	56	99.9

4.28.2 Recovery from treatment

Of the total cases of paralysis of all sorts majority of them are in continuing treatment 50 persons (89.3 percent) followed by cured and not yet 5.4 percent each respectively Table: 28.2).

Table: **28.2 Recovery**

S.N.	Recovery	Respondents	(%)
1.	Yes	3	5.4
2.	No	3	5.4
3.	Continuing treatment	50	89.3
	Total	56	100.1

Source : Field work.

4.29 Smoking and alcohol use

Among the 56 paralysis cases, 19 (33.9 percent has the smoking habits (Table: 29), except bettle all sorts of smoking that are bidi, cigarette, katua etc (Table: 29.1), daily and more than 3 times (Table: 29.2).and all present smokers had previous history of smoking, they left smoking for some duration and again started (Table:29.3).

Table: **29 Smoking pattern of the Respondents**

S.N.	Smoking	Respondents	(%)
1.	Yes	19	33.9
2.	No	37	66.1
3.	Total	56	100.0

Table : 29.1 Types of cigar

S.N.	Expenditure	Respondents	(%)
1.	Bidi	2	10.5
2.	Cigarette	1	5.3
3.	Katuwa	6	31.6
4.	Surti	8	42.1
5.	Jarda	1	5.3
6.	Pan (Bettle)	-	-
7.	Hucca	1	5.3
	Total	19	100.1

Table : 29.2 How many times a day

S.N.	How many times	Respondents	(%)
1.	1 time to 3 times	3	15.8
2.	4 times to 8 times	6	31.6
3.	more than 8 times	10	52.6
	Total	19	100.0

Table : 29.3 Previous history

S.N.	Previous history	Respondents
1.	Smoked for less than one year	4
2.	Smoked for more than one year	4
3.	Less than one year that I left	5
4.	More than one year that I left	6

Source : Field work.

4.30 Alcohol habits

The ill population in the study area had the alcohol use habits. Of the total 114 population, 11 (9.6 percent) (Table: 30) had the alcohol use habit which is not high in terms of the environment of the alcohol market. Of the alcohol users, 45.5 percent use sometimes but not regularly and one time, two times and more than two times have been used by 18.2 percent each respectively (Table: 30.1), and 72.7 percent (8 persons) has used 250 millilitres at one time, 2 persons used 500 millilitres and one took 750 millilitres alcohol (Table: 30.2).

Table: 30 Alcohol use by the respondents

S.N.	Alcohol use	Respondents	(%)
1.	Yes	11	9.6
2.	No	103	90.4
3.	Total:	114	100.0

Table: 30.1 If yes, how many times a day

S.N.	How many times	Respondents	(%)
1.	One time	2	18.2
2.	Two times	2	18.2
3.	More than two times	2	18.2
4.	Seldom	5	45.4
	Total	11	100.0

Table: 30.2 How much at one time

S.N.	How much at one time	Respondents
1.	250 ml (One quarter)	8
2.	500 ml (half bottle)	2
3.	750 ml (full bottle)	1
4.	More than 1000 ml (One litre)	-

Source : Field work.

4.31 Food habits

The food habits of the people found to be common that majorities take food more than two times a day depending upon the age of the family members. The frequency is higher of feeding to children, tiffin system is for children and labour workers in the field and in business. Most of the house caretakers take food two times a day and they take tea only at the morning and daytime (Table: 31). The eating foods are pulse and rice; pulse, vegetables and rice; and bread, vegetables are usually taken by all age group people (Table: 31.1).

Table: 31 Food intake practice of respondents

S.N.	Frequency	Respondents	(%)
1.	One time a day	-	-
2.	Two times a day	64	56.1
3.	Three times a day	47	41.2
4.	Four times a day	3	2.6
5.	More than four times a day	-	-
	Total	114	100.0

Table : 31.1 Types of foods

S.N.	How much at one time	Respondents	(%)
1.	Daal – Bhat	50	43.9
2.	Daal – Sabji-Bhat	51	44.7
3.	Roti – Sabji	13	11.4
4.	Others	-	-
	Total	114	100.0

Source : Field work.

4.32 Meat Consumption pattern

Majority of the population 66 (57.9 percent) out of 114 persons do not take meat (Table: 32) due to their religion, interest, habits and impressions on the use of meat that sometimes are tabooed. Those who take meat 48 persons (42.1 percent) usually take meat at more than a week person, only one takes daily, 3 persons take twice a week and one takes once a week (Table: 32.1).

Table: 32 Meat consumption pattern of the respondents

S.N.	Meat use	Respondents	(%)
1.	Yes	48	42.1
2.	No	66	57.9
	Total	114	100.0

Table : 32.1 If yes, frequency

S.N.	Frequency	Respondents
1.	Daily	1
2.	Two times a week	3
3.	Once a week	1
4.	More than a week	43
	Total	48

Source : Field work.

4.33 Production situation

The production situation of the ill persons whom were interviewed in the study area found sufficient for whole year has for 43 households (37.7 percent) and not sufficient for 71 households (62.3 percent) (Table: 33).

Table: 33 Production situations of the respondents

S.N.	Sufficiency for them	Respondents	(%)
1.	Sufficient	43	37.7
2.	No	71	62.3
3.	Total	114	100.0

Source : Field work.

4.33.1 Sufficient months of the production

As mentioned earlier that only 37.7 percent of the total 114 households has sufficient for full year. Of them, 33 households (28.9 percent has production for 9 months followed by 6 months 21 households (18.4 percent), 3 months 15 households (13.2 percent) and no grain for next day is of 2 households (1.6 percent) (Table: 33.1). The alternative sources for feeding programme is only labouring and wage labour (Table: 33.2) The situation indicates that the households are poor and are living with other temporary alternatives. In this hand to mouth problems they could not invest for their health purpose and if needed there is no other alternatives except taking loan in interests from other sources.

Table: 33.1 Sufficient for months

S.N.	Sufficient for	Respondents	(%)
1.	Whole year	43	37.7
2.	9 months only	33	28.9
3.	6 months only	21	18.4
4.	3 months only	15	13.2
5.	No grain for the next day	2	1.6
	Total	114	99.8

Table : 33.2 If not sufficient, the alternatives are

S.N.	Alternatives	Respondents	(%)
1.	Labouring	71	100.0

Source : Field work.

5. Discussion

Analysing the stroke by age shows that 42 (36 percent) patients were found under the age of 50 and majority of the patient in this group had irregular pulse and we presume that this group of patient the cause of stroke could be a thromboembolic, which coincide with the work 24 percent[16.17] and work done in TUTH 24 percent.[24]

Abnormal ECG was found in this group of stroke patient is 72 (63.1 percent) which coincide with the work of[15] clinico-cardiographic changes in patient with acute stage of ischemic stroke.

One of the study done in TUTH[24] shows that hypertensia on was the major risk factor (42 percent) found in the patient who are attending in TUTH. But this study shows that about 70 percent of the stroke patient had hypertnsion as a risk factor.

Analysing the frequency of the diabetics mellitus in these group of patients this study showed that about 12.2 percent of the patient had diabetics mellitus which will tally with the work[24] which states about 20 percent of the patients of stroke had diabetics mellitus.

The vast majority of strokes that occurs in patients with AF are believed to be cardiogenic origin but the actual incidence probably varies because of the accurancy of clinical diagnostic criteria.[20.27] But this study showed that about 27 (23.6 percent) had irregular cardiac rhythum.

Arterial fibrillation is an independent risk factor for stroke and is associated with as many as 24 percent of all the ischemic strokes.[20] Dynamic E.C.G. monitoring, echocardiographic study and camputet tomography of the head is essential to know the type of stroke.

6. Conclusion

For the people in Mechi Nagar Nagarpalika, Jhapa has many potentialities, good education status, health institutions, labouring opportunities, good peoples participations in the construction, development issues organised by municipality. This area is good for road and transportation, the boarder has provided opportunities to do business with India and inside the municipality, it has another potentiality that almost all the political leaders who have been elected are well educated and has good planning, organising, staffing, directing, co-ordination, reporting and budgeting system so that the municipality which is in incipient stage by its establishment has done prosperous progress in comprehensive ways. The health status of the people is not so bleak. Of the total 2988 households, 114 households (3.8 percent) have illness, which in comparisons to the national data is minimum. The health-seeking pattern is also good even though majority are using traditional healers, ethno-medicines and self- care.

The people in this municipality are poor. They do not have deposit for the health care purpose. Every time they are busy for their hand to mouth problems and if fall ill, they take money from other as loan paying interests. Due to their economic status, they do labouring, wage labour and arrange foods and other necessities for family. The consequences of the poverty of them, they are forced to contact traditional healers, ethno-medicine, self-care and taking loan for better treatment and the result is chronic condition and still suffering from stroke and its associates problems. They contact to the local health facilities whether they are traditional, self-care, ethno-medicines or allopathic one due to easy access, low cost, culturally attached, safes time and energy and less socio-economic burden.

This study shows that hypertension and diabeties mellitus are a major risk factor for stroke in that particular population.

Cardiac pathology was a major risk factor especially in economically active age group in population under age of 50.

7. Recommendations

This is a small study to see the prevalence of stroke in a district. Another study at the adjoining VDCs of the municipality is recommended to compare and contrast the determining factors of stroke and it's associated factors, for the prevalence and to refer, educate people on the proper medications.

The principle goal is to prevent the development of subintimal atheroma in arteries. Here control of hypertension, reduction of dietary intake of saturated fats and complete abstinence from smoking (i.e. changes in life style) are helpful. In hypertensive subjects for example careful gradual normalization of blood pressure levels, without precipitous/sudden drop should be achieved. Dietary adjustment to control obesity dyslipidemia, if present, should be made.

Hypertension is one of the most treatable risk factors for stroke. Lower the blood pressure, better is the prognosis for stroke prevention.

On the basis of this survey on stroke studies and in the absence of National Health Services / Registries, some recommendation are given.

It is essential to initiate community screening surveys on which defined population for detection of hypertension and stroke.

Adequate training of the available medical paramedical manpower by organising seminars is mandatory to standardise the nomenclature on the hypertension stroke control programme.

Majority of the people are depended with the traditional healers, self-care and with ethno-medicines, the problems are not solved and still not cured. In this situation people need awareness, health educations, further investigations and treatment. Different mobile camps with proper medical instruments and duly qualified practitioners are to be organised in each wards because the wards of the municipality are bigger by means of geography and population density.

Control of blood pressure, diabeties mellitus, smoking is essential to prevent stroke. A regular measurement of blood pressure in the schools, offices and in general public should be done

regularly through health camp and household visits. Health education about stroke and its economic and social impact in the society, family and nation as a whole should be given.

Patient with rheumatic heart disease with or without atrial fibrillation (AF), should have monitoring and full treatment to prevent thromboembolic strokes. For that standard anticoagulation laboratory should be established in the primary, secondary and tertiary centre.

Facility of echocardiography study to be established to evaluate the cardiac status as well as to rule out intramural thrombus to prevent thromboembolic stroke.

A computed tomomogrpahy should be established in primary health centre for the differentiated management of strokes.

For the illiterate population some non-formal education classes should be organised and in the classes, health related messages should be given.

The local health care providers of the government and private sectors need to get training to diagnose the stroke problem and to refer at the appropriate hospital.

There is Mechi Zonal Hospital and in the hospital one neurological centre or services are to be promoted with giving training to the doctors who are in the hospital.

8. References

1. Bagalepob, N.K. - *Cerebral crisis and stroke*. Text book of Neurology Moscow 19/1.
2. Litbak, I-b Cerebrocoronay syndrom in acute cerebrovascularaccidents. Texbook - Acute cerebrovascular disturbance Moscow 1960, 218-224.
3. Yachno, N.N. - Diagnosis and prognosis of parenchematosis haemorrhage with ventricular extension journal of neurology and psy. 1993, 2. Page (3-6).
4. Adams HP Jr. Biller J. Haemorrhagic intracraniel vascular disease. In Jyont RJ (ed): Clinical neurology, Vol 2. Philadelphia: Lippincott. 1988, Page (1-64).
5. Cahill DW, Ducker TB, Spontaneous intracebral haemorrhage. (Clin Neurosung 1982: 29: 722-779.
6. Kase CS, Mohr JP, Caplan LR, Intracerebral haemorrhage. In BarnettHJM, Mohr JP, Stein BM et al. (eds): Strok - Pathophysiology, Diagnosis, and Management, 2d 3d. New York: Churchill Liveingstone, 1992. Page (561-616)
7. Matlu N. Berry RG, Alpers BJ, Massive cerebral Haemorrhage. Clinical and Pathological Correlations. Arch Neurol 1963: 8:644-661.
8. Wityk RJ, Caplan LR, Hypertensive intracerebral haemorrhage: epidimiology and clinical pathology, Neurosurg Clin North Am 1992:3:521-532.
9. Brott T, Brodenik J. Ed. al : Early haemorrhagic growth in patients with intracerebral haemorrhagic; Stroke, 1977:28: M.1-5.
10. Kane Ko M. Tanaka K. Shimoda t. ed al: Long term evaluation of ultra-early operation for hypertensive intracerbral haematoma in 100 cases. Journal Neurosurg. 1983:58: 838-842 (Medicine)
11. Denise Nassissi, Richard S. Krause., Jefrey L Arnold-Stroke, Ischeamic page- 1 of 17 and stroke haemorrage page 1 of 19. Madlinesearch. Topic last updated 09/04/2000.
12. Actrachanceba C.P. - Electrocardiographic changetion in acute phase of stroke. Ph.D. Dissertation 1965, Moscow
13. Burch G.E. Sun S.C. Colcolough H.L., De Pasqualen. sohal R.S. - Acute myocardial lesions following intracranial haemorrhage in mice "a histological and histochemical study. Arch Path 1967, 84; 517-52.
14. Burch G.E. Colcolough H.C. Gilles T. - Intracranial lesion and the heart American heart Journal 1970: 80:4: 575-575.
15. K.K. Oli - Cerebrocardiac disturbances in haemorrhagic stroke. Ph.D. dissertation Moscow 1998.
16. Anathachari M.D. - a study of EKG changes in 20 cases of haemorrhagic stroke. Indian Heart Journal 1967:19:2: 105-113.

17. Usman V.B. Uruskobe C.H. - Clinicocardiographic ahngetion of patients with ischemic and haemorrhagic stroke. Textbook - Differential diagnosis of intracerebral haemorrhage and ischemic stroke i8n its acute phase Moscow 1973.

18. Martinob U.S - somatoneurologic and neurosomatic relationship. Somatic Syndrome Moscow 1979:3-17.

19. Hogg J.P., Gabriele O.F. Radiology of nontraumatic haemorrhage of the brain Kaufman H.H. (ed): Intracerebral hematomas, New York: Raven Press 1992:49-74.

20. Cerebral Emobolism taskforce cardiogenic brain anbolism. The second report of the cerebral embolism task face Arch Narol 1989, 46:727-743.

21. Anderson DC Kollar RL et.al. Atrial filmillatic and Stroke Navolyo 1998 4:235-238

22. Ageing and hypertension, diabeties mellitus, excessive alcohol consumption and smoking are listed as candidate risk factors (12).

23. Ko-bayashi S, Okada K, Koide H, et. al. Subcortical silent brain infarction as a risk factor for clinical stroke. STroke 1997, 25: 1932-1939.

24. K.K. Oli, J.P. Agrawal, Prem Khadka, Sashi Sharma, Critical review of stroke, First Scientific Conference in TUTH, 2001.

25. Cerebral Embolism Task Force. Cardiogenic Brain Embolism : The Second Report of the Cerebral Embolism Task Force. Arch Neurol 1989:46.

26. Anderson DC, Koller RL, Asinger RW, et.al. Atrial Fibrillation and Stroke: epidemiology, pathophysiology and management, Neurologist 1998:4.

27. Tanka H. Veda Y, Hayashi M, et. al. Risk Factors for Cerebral Haemorrhage and cerebral Infraction in A Japanese Rural Community Stroke 1982:13.

28. Gross CR., Kase CS, Mohr JP, et. al. Stroke in South Alabama : Incidence and diagnostic features: A population - based study. Stroke 1984:15.

29. Dalal PM, Dalal KP, Hypertension and stroke In : Sainani GS, Current Concepts in Hypergtension, Indian College of Physicians Bombay : Typo Graphics 1995.

30. Chopra JS and Sawhney IMS, Neurology in Tropics, 1999.

31. Study of Cardiac Disturbances - a hallmark for the early differentiation of haemorrhagic and ischemic stroke.

32. Richard SJ, Current Opinion in Narolosy, Frackowiale, Vol. 14, No. 1 February 2001, ISSW.

33. Adelman SM, The National Survey of Stroke/Economic Impact Stroke 1981:12 (Part II).