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A PROSPECTIVE STUDY OF HEARING IMPAIRMENT IN SCHOOL GOING CHILDREN OF GHAZIABAD CITY ATTENDING A TERTIARY CARE HOSPITAL

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ABSTRACT

Introduction: Overcrowding, poor hygiene, socio-economic status, climate, lack of resources to avail medical facilities, poor medical awareness have their bearing on the incidence of hearing loss .The family of each hearing-impaired child has its own cultural, social, educational, and financial background, and its own special needs. The aim of this study is to determine the percentage of hearing impaired school going children in Ghaziabad city.

Materials and Methods: The material for the present study were a representative sample constituting 1000 school children selected from various localities of Ghaziabad city within age group of 6 — 12 years. The children belonged to all the strata of society and children from both sexes were evaluated for hearing loss and its underlying etiological factors. Children were subjected to detailed ENT examination in our OPD.

Results: In the present study sample the incidence of hearing loss is 9.3 %. The maximum cases 60.22 % belonged to the low socio-economic strata. A statistically significant difference of distribution by gender was noticed with a male preponderance (61.29%) as against 38.71% for females. The hearing loss in majority of cases was of a mild degree i.e., 26 to 45 dB (34.41%) of which majority of cases (87.10%) had conductive loss. Wax was the commonest cause of hearing loss (41 .94%). CSOM was found in 21.50 % of all cases. Peak prevalence of hearing loss was found at 8 years of age, again declining after that from 20.43 % to 5.38 % by 12 years of age. Also it was observed that 59.14% children were living in

crowded localities of city & 40.86% were living in non- crowded/open locality which is again statistically significant (p< or =0.05)

Conclusion: The inferences drawn from the present study substantiates the view point of earlier workers that school screening is the most effective method of diagnosing deafness in school going children and should be extended to all schools in all the areas. Proper assessment and diagnosis of hearing loss in children at a very early age is important because an early diagnosis determines the efficacy of methods used for the correction of the hearing loss. Also early diagnosis of hearing impairment is a key to proper rehabilitation. The cases reporting to the hospital for treatment and rehabilitation can be regarded as the tip of the ice-berg and can have more management difficulties when compared to sub-clinical cases. ***Recommendations*** : improving the health services by promoting community medicine programmes and by employing pre-school and school hearing screening programmes the number of children affected by hearing loss will be reduced.

Keywords: Hearing loss, social factors, economic factors

INTRODUCTION

Adequate hearing acuity is of paramount importance and pre-requisite in the personality development of a child. Hearing impairment especially during early age has serious ill effects on child's psycholinguistic skills and school performance. A child struck with this malady is ex-communicative and absent minded. There is convincing evidence to suggest that for optimum development of speech and language, the auditory pathway must be stimulated from very early age to allow it and higher centres to mature properly. At present the research is directed towards early detection of deafness, a formidable task faced by Otorhinolaryngologists.

The repercussions of auditory deficits are more marked in children as the maximum development of their potentialities is affected. A child having congenital deafness of severe to profound degree can never develop speech, which plays a decisive role in the acquisition of various skills.

Conductive hearing loss develops if the ear canal is completely occluded, the ear drum is perforated, the middle ear is filled with fluid, or the ossicles are fixed or dislocated. Sensorineural hearing loss indicates a disease or abnormality of the inner ear or cochlea and/or of the eighth cranial nerve. Both conductive and sensorineural losses can be present at birth (congenital) or can develop later in life (delayed). Both types may be either genetic or result from acquired factors such as disease or injury.

Trauma to the ear can produce conductive, sensorineural or mixed impairments. Severe sensorineural hearing loss may result from a fracture of the temporal bone if the fracture line passes through the cochlea.

Genetic conductive losses may be detected in patients with stenosis of the ear canal or Apert Syndrome, Treacher Collins Syndrome, Marfan syndrome and other genetic diseases of musculoskeletal system. Exposure to viral infections or teratogenic drugs during gestation may also cause deformities of the conducting structures of the ear canal or middle ear. Delayed conductive loss may develop as a result of Albers Schonberg disease (Osteopetrosis), Osteogenesis imperfecta, otosclerosis or Paget's disease of bone. There are certain congenital diseases which predispose to secretory otitis media and these include cystic fibrosis, non-motile cilia syndrome, cleft palate and immune deficiency disease thereby acting as pre-disposing factors in the causation of acquired conductive hearing loss. Acquired conductive deafness can also result from inflammation (otitis externa, acute suppurative otitis media, chronic suppurative otitis media, acute secretory otitis media or chronic secretory otitis media, trauma (direct trauma to tympanic membrane, haemotympanum, or ossicular chain disruption), foreign body or wax.

Most of the causes of hearing impairment in school age children are conductive in nature as indicated in many surveys e.g., (McCandless 1974, 80%)(1), and majority of them if recognized early might be amenable to simple medical or surgical intervention The causes of external ear origin like cerumen or fungus lead to mild to moderate hearing loss (Portman M. and Portman C. 1962) (2)which is merely of temporary nature and usually hearing returns to normal once it is removed without causing any permanent disability. On the other hand diseases like otitis media both suppurative and non-suppurative may lead to permanent damage which requires lengthier and cumbersome treatment modalities if early detection is not made.

Early detection of other diseases concomitant with and predisposing to otitis media like diseases of nose and throat, certain systemic diseases (tuberculosis or syphilis), exanthematous fevers (thyroid, measles or chickenpox) or congenital malformations (cleft palates), is mandatory for getting gratifying results so far as hearing is concerned and will certainly reduce the magnitude of the problem in school children.

Sensorineural hearing loss has diverse etiological factors. When hearing loss is noted at birth, a sensorineural loss should be suspected. Sensorineural deafness may accompany various syndromes .Genetic Syndrome is important to recognise because affected families need genetic counselling.

Acquired causes of sensorineural hearing loss in children include maternal use of ototoxic drugs, viral infections that affect the foetus (maternal rubella), metabolic disorders (Cretinism), Rh- incompatibility, irradiation in the first trimester, prematurity, foetal distress (Apgar Score 0-3), and anoxia. Risk of deafness also increases with low birth weight (< 1500 g), hyperbilirubinemia (necessitating transfusion), bacterial meningitis, family history of childhood deafness and anatomical malformations of the head and neck. Many such children

are mistakenly thought to be mentally retarded. Other causes include trauma, Meniere's disease or neoplastic diseases and generalized neurofibromatosis.

Certain infections leads to sudden sensorineural deafness include infections (mumps, measles, meningitis, varicella), trauma (concussion, fractures of temporal bone, perilymph fistula) and idiopathic in which possible mechanism may be vasospasm, thrombosis or embolism causing cell anoxia. Even in acquired deafness there is contribution of hereditary component. Genetic factors intervene in determining susceptibility to infecting organisms, perinatal mishaps and ototoxic drugs.

Long standing middle ear infections as well as congenital abnormalities like mucopolysaccharidosis can cause mixed type of deafness. Psychogenic element per.se or organic disease with psychogenic overlay should not be overlooked before reaching a final conclusion regarding possible aetiologies in hearing impaired children.

Overcrowding, poor hygiene, socio-economic status, climate, lack of resources to avail medical facilities, poor medical awareness and genetic characteristics have their bearing on the incidence of hearing loss.

Most earlier works indicate that five per cent of all school going children have hearing losses sufficient to warrant further evaluation. Ninety per cent of these losses are medically correctable if found early enough. But if special efforts are not made to identify these cases, they suffer from the detrimental effects of hearing loss. Bacterial meningitis continues to play an important etiological role in childhood hearing loss. Seeing the factors involved a proper assessment and evaluation of hearing of school going children is essential. The first part of the assessment must be spent in taking a brief relevant history about child's hearing, it is better to move quickly to clinical assessment since children become restless and anxious very quickly in unfamiliar surroundings. A history including family history, speech development, exposure to pathogens, history of prenatal-, perinatal- and postnatal- mishaps, trauma, academic and behavioural problems may be obtained later. Clinical assessment should include tuning fork tests and audiometric tests. School hearing screening has two major goals — the detection of pathology and degree of hearing loss. A basic screening assessment of audiological function can be made with the help of tuning fork tests and the results must be correlated with otoscopic assessment, acoustic impedance and pure tone audiometry to understand the nature of pathology and to assess the degree of hearing loss. otoscopy is a reliable screening method for the detection of middle ear disease which accounts for up to 80% of hearing losses in paediatric population.

Investigation of the cause of deafness is mandatory not only from the management of view but also because parents want to know about the risk to subsequent children and also to future generation

After assessment of hearing loss in school children, necessary information, support and encouragement to parents as well as advice about remedial measures should be provided with a view to prevent or limit the disability. The factors that affect the eventual quality of speech and language development include date of diagnosis, use made of residual hearing, age of

onset of hearing loss, family support and quality of language environment, individual differences and rehabilitative measures where necessary. Conductive losses are amenable to timely intervention by conservative or surgical measures. Sensorineural hearing loses have guarded prognosis and limited choice. The mainstay of management in Sensorineural hearing impairment is fitting of hearing aids followed by auditory training at the earliest possible stage. Cochlear implant can be reserved for those children who get no benefit from conventional amplification after a minimum one year closely supervised trial accompanied by an intensive aural rehabilitation programme. Younger and multiple handicapped children require longer trial periods. There is a need for a team approach and there must be flexible interchange of ideas and information between parents, teachers and clinicians. They should maintain a high index of suspicion regarding possible hearing loss in elementary school children with academic and behavioural problems. There is clearly need for improved awareness and better education of both parents and professionals if ear disease is to be detected early. Early detection of hearing impairment is a key to their proper rehabilitation. Awareness of the causes of deafness helps to identify high risk groups and assists in the planning of programmes for prevention or reduction of deafness in these groups.

MATERIAL AND METHODS

The material for the present study were a representative sample constituting 1000 school children selected from various localities of Ghaziabad city within age group of 6 — 12 years. The children belonged to all the strata of society and children from both sexes. They were evaluated for hearing loss and its underlying etiological factors.

Children having:

1) Prior history of hearing loss and its underlying etiological intervention.

2) Recent upper respiratory tract disease; and

3) Children on medication for any chronic illness were excluded from the study.

Schools were visited after prior permission of the concerned headmasters through a requisition letter from the H.O.D., Department of E.N.T. Santosh Medical College and Hospitals, Ghaziabad. The concerned teachers as well as children were taken into confidence by explaining them the manifold benefits of the study in assessing the magnitude of the problem of hearing impairment and thereby suggesting appropriate measures for reduction in the size of the problem in school children for their benefit. After obtaining history in which we take First General History, then detailed E.N.T. history regarding present complaint with the assistance of the concerned teacher, Family history, Past history regarding (relevant Prenatal and perinatal data), Dietary and developmental history, History of ENT infections during infancy and early child hood, History of head injury, ear trauma or noise trauma, Any medical or surgical intervention with special reference of ENT. All the children were subjected to general physical examination and the examination of ear. Children were subjected to detailed ENT examination in our OPD. Mobility of tympanic membrane was tested, which was also used to ascertain the presence of any fistula sign. Then nose and throat

were examined in detail. Airway was examined for tonsils, palate and the posterior pharyngeal wall. The examination of ears included (Examination of pinna and external auditory canal, tragal tenderness or fistula sign was noted, tympanic membrane, Mobility was tested by Valsalva manoeuvre, Tuning fork test; Rinne's test, Webber's test and Absolute Bone Conduction (ABC) test were performed with tuning forks of 512 Hz.Those children found to have hearing impairment as per history and/or examinations were the subjects for Lab. Investigations.

OBSERVATIONS AND RESULTS

The present study was conducted in a representative sample of school children drawn from various schools in Ghaziabad city. The present sample constituted 1000 children within the age group of 6-12 years out of them 93 (9.3%) of children were found to have hearing impairment established by history and clinical examination and needed further evaluation in order to find out the underlying aetiologies of hearing impairment.

TABLE 1: AGE AND SEX DISTRIBUTION OF CASES WITH HEARING IMPAIREMENT

AGE(IN YEARS)	MALES	FEMALES	TOTAL	PERCENTAGE (%)
6	8	4	12	12.90
7	10	6	16	17.20
8	11	8	19	20.43
9	11	6	17	18.28
10	9	6	15	16.13
11	5	4	9	9.68
12	3	2	5	5.38
TOTAL	57(61.29%)	36(38.71%)	93	100

TABLE 2: DURATION OF HEARING LOSS IN 93 CHILDREN

DURATION OF HEARING LOSS(in years)	NO. OF CHILDRENS	PERCENTAGE (%)
0-1	34	36.56
1-3	26	27.96
3-5	20	21.50
5-7	7	7.53
7-9	4	4.30
>9	2	2.15
TOTAL	93	100%

TABLE3: MODE OF ONSET OF HEARING LOSS AMONGST 93 PATIENTS OF HEARING IMPAIREMENT

S.NO.	MODE OF ONSET	NO. OF CASES	PERCENTAGE (%)
1	Sudden	14	15.05
2	Gradual	79	84.95
TOTAL		93	100

TABLE : VARIOUS SYMPTOMATOLOGY AMONGST 93 PATIENTS OF HEARING IMPAIREMENT

S.NO.	SYMPTOMS	NUMBER OF CASES	PERCENTAGE (%)
1	Decreased hearing	93	100
2	Ear discharge	20	21.51
3	Heaviness in ear	36	38.71
4	Pain in ear	35	37.63
5	Decreased hearing(only)	2	2.15

TABLE5 : VARIOUS SIGNS FOUND ON EXAMINATION OF EAR AMONGST 93 PATIENTS OF HEARING IMPAIREMENT

S.NO.	SIGNS	NO. OF CASES	PERCENTAGE (%)
1	Tympanic membrane perforation	22	23.66
2	Discharge in ear canal	20	21.50
3	Wax in ear	39	41.94
4	Positive tragus sign	6	6.45
5	Mastoid tenderness	4	4.30
6	Postaural swelling	2	2.15

TABLE 6: INCIDENCE OF AURAL FINDINGS ON OTOSCOPY AMONGST 93 PATIENTS OF HEARING IMPAIREMENT

S.NO.	AURAL FINDINGS	NO. OF CASES	PERCENTAGE (%)
1	Normal tympanic membrane(including wax patients after removal of wax)	31	33.33
2	Central perforation	15	16.13
3	Marginal perforation	4	4.30
4	Attic perforation	3	3.23
5	Retracted tympanic membrane	28	30.11
6	Secretory otitis media	6	6.45
7	Polypoidal changes	6	6.45
TOTAL		93	100

TABLE 7: TUNNING FORK STATUS AMONGST 93 PATIENTS OF HEARING IMPAIREMENT

S.NO.	TYPE OF TEST	NO. OF CASES	PERCENTAGE(%)
1	+R+	38	40.87
2	+R-	15	16.13
3	-R+	19	20.43
4	-R-	13	13.98
5	N.ABC ∨	7	7.52
6	∨ABC∨	1	1.07
7	Lateralization of Weber	66	70.97

TABLE 8 : DISTRIBUTION OF 93 PATIENTS OF HEARING IMPAIREMENT ON THE BASIS OF UNILATERALITY/BILATERALITY OF DEAFNESS

S.NO.	TYPE	NUMBER OF CASES	PERCENTAGE (%)
1	Unilateral(right)	24	25.81
2	Unilateral (left)	18	19.35
3	bilateral	51	54.84
TOTAL		93	100

TABLE 9 : TYPE OF LESION RESPONSIBLE FOR DEAFNESS IN 93 PATIENTS OF HEAING IMPAIREMENT

S.NO.	TYPE OF LESION	NUMBER OF CASES	PERCENTAGE (%)
1	CSOM	20	21.50
2	ASOM	9	9.68
3	WAX	39	41.94
4	Trauma	14	15.06
5	Secretory otitis media	6	6.45
6	Sensorineural deafness	1	1.07
7	Idiopathic	43	4.30
TOTAL		93	100

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TABLE: 10 TYPE OF HEARING LOSS AMONGST 93 PATIENTS OF HEARING IMPAIREMENT

S.NO.	TYPE OF HEARING LOSS	NUMBER OF CASES	PERCENTAGE (%)
1	Conductive	81	87.10
2	sensorineural	1	1.07
3	mixed	11	11.83
TOTAL		93	100

TABLE 11: SHOWING DEGREE OF DEAFNESS ON AUDIOMETRY AMONG 93 PATIENTS (ON THE BASIS OF BROOK HOUSERET AL 1991)

S.NO.	DEGREE OF DEAFNESS	NO.OF CASES	PERCENTAGE
1	Borderline(16-25dB)	23	24.73
2	Mild (26-45dB)	32	34.41
3	Moderate (46-65dB)	28	30.11
4	Severe(66-85dB)	10	10.75
5	Profound (>or=86dB)	0	0
6	Anacusis(no measurable threshold)	0	0

TABLE 12: SHOWING RADIOLOGICAL STATUS AMONGST 22 PATIENTS OF HEARING IMPAIREMENT

S.NO.	FINDINGS	NUMBER OF CASES	PERCENTAGE(%)
1	Normal air cells	5	5.38
2	cholesteatoma	1	1.08
3	Haziness of mastoid	16	17.20
4	No x-ray	71	76.34

TABLE 13 : TREATMENT MODALITIES RECEIVED BY 93 PATIENTS OF HEARING IMPAIREMENT

S.NO.	TREATMENT MODALITIES	NUMBER OF CASES	PERCENTAGE(%)
1	Medical treatment	51	54.84
2	syringing	39	41.94
3	surgical	3	3.22
TOTAL		93	100

DISCUSSION

A total of 1000 school age children drawn from various schools in Ghaziabad city were screened. Out of these 93 children were having hearing impairment due to different causes. Overall incidence of hearing impairment in school age children was 9.3 % in our study. These figures are in close agreement with earlier studies. Out of 93 patients, 79 were below 11 years of age. This finding is in close agreement with Rajendra Kumar (1974)(3) who found that of all the patients attending E.N.T. department of Government Erskine Hospital, Madurai, for ear complaints per year, 75 % were children below age of 14 years. A total 57 patients were boys (61.29 %) as compared to 36 girls (38.71 %). These figures are again in close agreement with Tuli et al (1988)(4) who screened school age children and found that out of conductively deaf children 75 % were males and 25 % females. Low socio-economic status appears to have an important part to play in pre-disposition of disease. In our study a total of 56 patients (60.22 %) belonged to the low-socio economic strata. These findings are in agreement with survey conducted by Rajendra Kumar (1974)(3) who reports that 90 % of the cases of CSOM belonged to low socioeconomic strata. The same findings are substantiated in studies conducted by Tuli et al (1988)(4).Our study also allowed us to conclude that children residing in congested homes were more prone to hearing deficits (about 59.14 %).In our study of 93 patients, the most common mode of onset was found to be gradual onset (84.95 %). This is in close agreement with Tuli et al (1988)(4) in whose study about 60 % patients were having hearing impairment due to chronic (gradual onset) diseases. In our study of 93 patients instillation of some household medications in the form of oil, H202 etc. was noted in maximum number of patients (38.71 %). Pain in ear was the predisposing factor in 29 patients (3.18 %). Next most common factor was ear trauma (including ear picking and slapping over ear) that accounted for (15.05 %) 14 cases. Out of

93 patients having hearing impairment the prominent symptoms were heaviness in ear (38.71 %), pain in ear (37.63 %), ear discharge (21 .51 %). according to our study. Sachdeva and Bhatia (1965)(5) also found that more than 30% of cases attending ENT OPD for ear problem were having discharging ear. Turner Logan (1988)(6) also noted that deafness was the most common symptoms of ear diseases. In our study of 93 patients, 21 cases of ear discharge were noticed. Out of these 21 cases, 12 cases were having muco-purulent/purulent discharge. In 3 cases discharge was very foul smelling and scanty. In about 6 cases discharge was purely of serous variety. After cleaning the discharge, ear was examined to see the tympanic membrane. It was found that 31 cases were having normal tympanic membrane (patients whose wax was removed by syringing/ probing were also included in this group).Central perforation was present in 15 cases (16.13%). Scott Brown(1997)(7) also reports central perforation to be most commonly present in CSOM, in 4 cases (4.30%) marginal perforation and in 3 cases (3.23%) attic perforation was present. Retracted tympanic membrane was present in 28 cases (30.11%). Tuli et al (1988) found perforation in 56%cases and in about 27% cases retracted tympanic membrane was reported. These findings are also similar to that reported by Elahi et al (1998)(8)

In our study of 93 patients about half were having bilateral hearing loss while right unilateral and left unilateral hearing loss was equal (Right unilateral hearing loss was higher in prevalence.). The lateralization of Weber test was found to be most sensitive which is in accordance with Scott Brown(1997)(7) who described Weber to be more sensitive than Rinne's test. The most consistent type of lesion responsible for deafness in our study was Wax -39 cases (41 .94%). This figure closely resembles the study by Mishra et al (1960-61)(9), who observed that out of all cases of hearing impairment in children, 45.2% were having wax. The second most common cause responsible for hearing impairment was CSOM —20 cases (21.50 %). This correlates with study by Sachdeva and Bhatia (1965)(5) who reported that more than 30% of patients with hearing impairment were suffering from CSOM. Secretory otitis media constituted 6 cases (6.45%) among the total 93 patients screened in our study. This appears in conjunction with the study by Apostolopoulos et al (1998)(10) who found that 6.5% children had OME. Sensori neural deafness (SND) was seen in only one case (1 .07%). It correlates with study of Tuli et al (1998)(4) who reported 0.41% incidence of SND in school age children and also with the study of Lenarz (1999)(11) who studied SNHL in children. In type of hearing loss among 93 patients, conductive type of deafness was commonest type if hearing loss seen in 81 cases (87.10%) and second most common type of deafness was mixed deafness 11 cases (11.83%). This closely agrees with study of Mishra et al (1960-61)(9), Rajendra Kumar (1974)(3),TuIi et al (1988)(4), Mann et al (1998)(12), and Elahi et al (1998)(8). They also noted that in children most common type of hearing loss is of conductive type. In our study group the degree of deafness found most commonly was mild degree of deafness, it constituted 32 cases (34.41 %). Severe deafness was found only in 10 cases (10.75%).This is in agreement with Niskar et al (1998)(13) who found that most of the children were having low frequency hearing loss, slight in severity (16 to 25db hearing loss).In our study of 93 patients having hearing impairment, 22 patients were investigated radiologically (particularly those with discharging ear). In majority of cases mastoid air cells were abnormal. Most common pattern found was Haziness of mastoid 16 cases (17.20%).In

our study of 93 patients of hearing impairment, 51 cases (54.84%) received medical treatment alone. Out of these 51 cases, 38 had improvement in their symptoms, while 13 cases had no improvement. Surgical treatment (Mastoidectomy) was received by 3 cases (3.22%) and out of these 2 cases were relieved of their symptoms, 1 case complained of no improvement.

CONCLUSION

The inferences drawn from the present study substantiates the view point of earlier workers that school screening is the most effective method of diagnosing deafness in school going children and should be extended to all schools in all the areas. Otoscopic screening has come up as the most effective preliminary handy tool to screen school children ..Ambient noise which distracts attention especially in busy and crowded schools would have seriously affected results had pure tone screening been used at school level though it could have picked up one case of sensorineoural hearing loss who did not exhibit otoscopic abnormality, but at the same time it could have missed 23 cases (24.73%) of minimal loses (<25 dB) as most audiometric screening programs use a fixed intensity of 25 db. Moreover impedance audiometry which is a simple and efficient objective test was done were middle ear pathology had to be confirmed. Otoscopy with tuning fork test is the most efficient method to detect conductive and sensorineural losses which in the present study were detected in (98.93%) of hearing impaired children. Hence it is inferred that the most thorough evaluation of auditory problems is accomplished by use of otoscopic examination and tuning fork tests followed by auditory threshold testing and tympanometry. This depicts that otoscopic screening supplemented by tuning fork tests are very useful procedures for detecting the deafness in school going children. The cases reporting to the hospital for treatment and rehabilitation can be regarded as the tip of the ice-berg and can have more management difficulties when compared to sub-clinical cases. otoscopic and audiological work up remains the mainstay of detecting hearing impairment in school age children before a chronic pattern of ear disease has set in. Utilization of mass media to educate the parents and teachers about long term effects of ear disease should be done. This can be reinforced by deployment of health workers who can educate common masses about do’s and don’ts regarding prevention of ear disease and also mitigate old notions of instillation of oil, etc. into the ear for relief of ear ache.. There is a need for team approach and there should be interchange of information between parents, teachers and clinicians if ear disease is to be detected early.

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