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Dr U Singh

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Risk Factors and Stroke Outcome – An Indian Study

Dr Uma Pandiyan, MBBS, D.Phys Med., DNB (PMR) Consultant Psychiatrist*

Prof G. Arjundas, MD, FRCP (E) Professor Emeritus –Neurology#

Dr. Deepak Arjundas, MD, DM (Neuro) Head of Department of Neurology*

*Stroke Unit, Vijaya Health Centre, 175, NSK Salai, Vadapalani, Chennai- 600026

Mercury Nursing Home, 36, Pantheon road, Egmore, Chennai -600008

Abstract

Stroke is the second leading cause of death and one of the commonest causes of disability in adults. It is potentially the most devastating consequence of vascular disease, causing serious long-term disability and incurring extremely high medical, emotional and financial costs.

In Chennai, we conducted the ICASS-II /WHO stroke surveillance study from Dec 2003 to Dec 2004. A total of 402 definite stroke patients were evaluated.

In this paper we evaluate the risk factors of stroke (such as age, hypertension, diabetes, ischemic heart disease, dyslipidemias and nicotine.) and stroke outcome. The stroke outcome was evaluated by the Modified Rankin Scale on the 28th day of illness. We found that hypertension was the commonest risk factor. Recovery depended essentially on the type, sub-type of stroke and its severity. The morbidity and mortality increased with a combination of risk factors. We found that there is a statistically significant trend which shows that in stroke patients age, diabetes, IHD and tobacco increases morbidity with severe disability and mortality.

Key words: stroke, risk factor, outcome, Modified Rankin Scale, hypertension, IHD, diabetes, tobacco, disability

Introduction

Stroke is a heterogeneous syndrome caused by many disease mechanisms, all of which result in disruption of cerebral blood flow and subsequent tissue damage. It is the second leading cause of death¹ and one of the commonest causes of disability in adults. In 2001, stroke accounted for 5.5 million deaths world wide which is equivalent to 9.6% of all deaths. Two-thirds of those deaths occurred in people living in developing countries.¹ While India is still struggling with the problems of communicable diseases, noncommunicable diseases are on the rise. Stroke is potentially the most devastating consequence of vascular disease, causing serious long-term disability and incurring extremely high medical, emotional and financial costs. Hypertension is the leading risk factor for stroke. Control of hypertension can decrease the morbidity and mortality due to stroke. Age is an important and independent risk factor for stroke (Wolf et al 1992)². 20-30% of the hospital stroke population falls below the age of 40 years (Nagaraja and Taly 1988).²

Objective

The objective of the study was to evaluate various risk factors of stroke and their outcome in India. The risk factors evaluated were age, hypertension, diabetes, ischemic heart disease, dyslipidemias and nicotine.

Materials and Methods

This ICASS-II /WHO Stepwise stroke surveillance study is a sequel to the ICASS - I study conducted in 2002. ICASS is the acronym for Indian Co-operative Acute Stroke Study done by the Indian Stroke Association. A total of 402 patients were evaluated at two stroke units in Vijaya Health Centre and Mercury Nursing Home in Chennai, India. The recommended standard WHO stroke definition is “a focal (or at time global) neurological impairment of sudden onset, and lasting more than 24 hours (or leading to death) and of presumed vascular origin”.³ The strokes were confirmed by CT or magnetic resonance scanning. The study duration was from Dec 2003- Dec 2004. A pilot study of 10 cases was evaluated before the actual study started in Dec 03. The WHO stroke surveillance part of the study focuses on hospitalized stroke patients only (STEP- 1). We did not undertake the evaluation of strokes in the community (STEP -2 and STEP-3) due to various reasons.

Address for Correspondence: Dr Uma Pandiyan, Consultant Psychiatrist Stroke Unit, Vijaya Health Centre 175, NSK Salai, Vadapalani Chennai- 600026 e-mail: umapandiyan@gmail.com

The epidemiological data of age, sex, occupation, socio-economic status, race and religion were also obtained for the surveillance study. The type and sub-type of strokes were established and analyzed. However in this paper we will focus on risk factors and stroke outcome as it is the result of our rehabilitation program. The severity of strokes was evaluated by international scales such as the modified NIH scale and the outcome by the Modified Rankin Scale.⁴ The NIH scale was evaluated on admission and by 7-10 days. The MRS was evaluated after 4 weeks by physical evaluation or by telephonic interview of the attendant. In this study 4 week follow up was possible in 354 of the 402 patients. This was because some patients come from remote rural areas where communication links are inadequate and also due to illiteracy. The scoring of the Modified Rankin Scale is <2 where the patient is walking independently and requires no assistance for his/her ADL. MRS score of 3-4 is moderate disability where ADL assistance is required and 5 is severe disability where the patient is totally dependent for his/her ADL and a score of 6 refers to death.

The risk factors of age, hypertension, diabetes mellitus, ischemic heart disease, dyslipidemia, and nicotine intake were evaluated.

Risk factor inclusion criteria are as follows. Hypertension is diagnosed if BP is >140/90 on 2 independent readings or on anti-hypertensive treatment. Diabetes mellitus is defined if 2 independent reading of blood glucose is >180mg/dl (post-prandial – venous sample) or an elevated glycosylated hemoglobin or on anti diabetic treatment. Hyperlipidemia is defined if the total cholesterol was above 200mg/dl or LDL is more than 160mg/dl or triglycerides more than 150 mg/dl or VLDL is >26mg/dl.

The statistical analysis used p-value and odds ratio using multiple logistic regression (forward stepwise addition method) to infer the statistical significance of the various risk factors. Pearson correlation analysis was also done to look for linear association between single and combination of risk factors.

Observations and Results

Age

77.8% of our patients were between 50 and 79 years of age. The youngest patient was 17 years old and our oldest patient was 92 years. The morbidity with severe disability and death is maximum in the 6th to 8th decades as revealed by MRS scores of 5 and 6. The p-value is 0.04 which is statistically significant. Refer Table 1.

The mean age of stroke is 61.7. The standard deviation is 13.4.

Table 1 Patients Age vs MRS Score

Age	Modified Rankin Scale Score				p-value
	Mild <2	Moderate 3-4	Severe 5	Death 6	
<29	5	2	0	2	
30-39	8	3	1	2	
40-49	17	2	1	1	0.04 (sig)
50-59	44	15	7	11	
60-69	55	31	26	12	χ^2 34.09
70-79	38	14	12	14	d.f. = 21
80-89	12	4	4	8	
90>	0	0	1	2	
Total	179	71	52	52	

Gender

We had 265(65.9%) male patients and 137(34.1%) female patients. The stroke outcome was evaluated in 354 patients and there was no statistical significance in the gender and stroke outcome. Refer Table 2 Gender vs MRS Score.

Table 2 Gender vs MRS Score

Gender	Modified Rankin Scale Score				p-value
	Mild <2	Moderate 3-4	Severe 5	Death 6	
Male	119	44	32	37	0.67 (not sig)
Female	60	27	20	15	χ^2 1.56
Total	179	71	52	52	d.f. = 3

Modifiable Risk Factors

Hypertension was found to be a major risk factor of stroke in 72 percent of the patients. It was found separately and in combination with diabetes mellitus and IHD. 49.8% had diabetes mellitus and 33.8% had ischemic heart disease. Around 16% of the patients in this study had no significant risk factor detected with the present facilities and methods available. Refer to Table 3.

Table 3. Incidence of Modifiable Risk Factors

Risk Factor	No of cases	Percentage
Hypertension	289	71.9%
Diabetes mellitus	200	49.8%
Ischemic heart disease	136	33.8%
Atrial fibrillation	13	3.2%
Valvular heart disease	14	3.5%
Congenital heart disease	2	0.5%
Total Cholesterol	105	26.1%
HDL Low	159	39.6%
LDL High	30	7.5%
TGL High	117	29.1%
VLDL High	155	38.6%
Nicotine	95	23.6%
Anemia	40	10.0%

Hypertension

289 patients (72%) of the 402 were hypertensives. The 4 weeks follow up by modified Rankin scale was possible in 354 patients. Out of this 260 were diagnosed as stroke with hypertension as risk factor (HT alone or in combination with other risk factors). 140/90 mmHg and above was taken as hypertensive. 129 of them had a mild disability, 57 had moderate disability and 41 had severe disability and 33 patients died. The p – value is 0.15 which is statistically not significant.

Diabetes

173 patients were diabetic. Blood sugar (post prandial venous sample) >180 mg/dl were taken as diabetics. 76 were mildly disabled while 37 had moderate disability and 27 had severe disability and 33 expired. The p-value is 0.049 and is statistically significant. This means that diabetics definitely had higher morbidity and mortality

Ischemic heart disease

126 patients were found to have IHD. These were diagnosed by the electrocardiogram and ECHO findings and confirmed by a cardiologist. 53 patients had mild disability while 46 of them had severe morbidity and mortality (MRS 5 & 6). Hence the p-value was not significant.

Table 4 Modifiable Risk Factors vs Stroke Outcome

Risk Factor	Modified Rankin Scale Score				p-value
	Mild <2	Moderate 3-4	Severe 5	Death 6	
Hypertension	129	57	41	33	0.15 NS
Diabetes mellitus	76	37	27	33	0.049 Sig
Ischemic heart disease	53	27	23	23	0.37 NS
Total	96	37	24	19	0.21 NS
LDL cholesterol	137	49	27	29	0.43 NS
TGL	87	33	21	22	0.26 NS
VLDL	71	23	19	14	0.15 NS
Nicotine	48	16	8	8	0.42 NS

Dyslipidemia

The individual components of the lipid profile such as total cholesterol, HDL, LDL, VLDL and TGL were 26.1%, 35.6%, 7.5%, 38.6% and 29.1%. On statistically analyzing the data the p-values were 0.21, 0.43, 0.15, 0.25 and 0.26. All of them are not significant in altering the outcome of stroke.

Tobacco

23.6 percent of the stroke patients consumed tobacco – either via smoking cigarettes or beedis, or chewing tobacco with betel leaves or nasal snuff. The quantity of tobacco consumed by the smokers was not estimated. The p-value was not significant in comparison with other risk factors (0.42) however on comparing the outcome of smokers and non-smokers there was a definite statistical significance. The p-value is 0.009.

Analysis of Results

On evaluating a combination of risk factors diabetes and hypertension - the number of patients with 5 & 6 on the MRS showed severe morbidity and mortality than those with minimal disability <3. Refer to Table 4.

There were only 8 stroke patients with IHD alone as the risk factor and only 15 patients with Diabetes and Ischemic heart disease (out of 354) as the risk factors. This figure is too small to be statistically analysed. However though there is an association of DM and IHD in the multi-factorial etiology of stroke these risk factors independently do not add any additional risk to the stroke outcome.

When three or more risk factors (Hypertension, diabetes and ischemic heart disease) are involved the mortality (MRS 6) rises to one-fifth. Refer to Table 5.

Table 5. Modifiable Risk Factors alone and in Combination

Risk Factor	Modified Rankin Scale Score				Total
	Mild <2	Moderate 3-4	Severe 5	Death 6	
Hypertension	42	14	10	4	70
Diabetes mellitus	10	1	1	4	16
Ischemic heart disease	4	2	0	2	8
HT +DM	42	20	12	13	87
HT+IHD	25	9	9	5	48
DM+IHD	4	2	4	5	15
HT + DM + IHD	20	14	10	11	55
No risk	32	9	6	8	55

Analysis of combination of DM, HT and IHD and outcome showed p value of .003 which is statistically significant.

There is a linear trend indicating that a combination of risk factors increase the disability, morbidity, and mortality of stroke. However a larger study would be required to establish a definite association.

Table 6 Regression Analysis Results

<i>Independent risk factor</i>	<i>Regression coefficient</i>	<i>S.E (6)</i>	<i>p-value</i>	<i>Odds ratio</i>
Age	0.31	0.16	0.045	1.37
Diabetes mellitus	0.71	0.31	0.02	2.02
IHD	0.69	0.31	0.03	1.98

The results of multiple logistic regression analysis (Table 6) shows, an increase in morbidity and mortality with the MRS scores more than 4 in the above risk factors of age, diabetes mellitus and ischemic heart disease. The non-significant variables are sex, hypertension and LDL (dyslipidemias). Hypertension is the most significant risk factor. However the stroke outcome is not affected as there are proportionate number of hypertensives with favourable outcome (MRS<4) as there are with increased morbidity and mortality (MRS 5&6).

Discussion

In our study the age group of maximum stroke incidence was 50-79 years with a mean age incidence of 61.7 ± 13.4 (SD). In the German Stroke Data Bank study by Armin J Grau et al⁵ the age incidence was almost similar with 65.9 ± 14.1 . The above mentioned study also used the Modified Rankin Scale to follow up the patients. A few other studies used the Barthel Index along with the Modified Rankin Scale. We used the Modified Rankin Scale because it is simple and easy to assess by the clinician and the attendant. It could be assessed over the phone and it was essentially part of the WHO Stroke Step questionnaire (version 1.1).

A study done in Karachi, Vohra EA⁶ also shows similar results of increased mortality and morbidity due to advancing age and cardiac illness. This study from Pakistan has similar demographic data as the Indian subcontinent. Majority of their cases were between 4th and 6th decade. They had 50% hypertensives, 19% CAD and 18% diabetes and 17% were smokers.

Gender differences are present in the incidence of stroke in our study. 65.9% were men and 34.1% were women. However this could reflect the gender bias existing in Indian society. There is no statistically significant difference in the stroke outcome due to gender.

In our study elevated total cholesterol, LDL, VLDL, TGL and lower HDL values have not directly altered the outcome of stroke. Similar finding have been observed by Ross et al.⁷ Ross R found that elevated serum cholesterol has not been linked to an increased stroke incidence. However it indirectly increases stroke risk due to hypercholesterolemia and coronary artery disease. His study was a large prospective observational study of middle-aged men and found no relationship between

plasma total cholesterol concentration and 16.8 year incidence of fatal or non-fatal stroke.

Another large 10-year prospective study in Britain⁸ by Wannamethee SG (Stroke 2000), of 14,175 middle-aged men and women, free of clinical cardiovascular disease at the outset, found a weak inconsistent relationship between low density lipoprotein-cholesterol (LDL-c) or high density lipoprotein-cholesterol (HDL-c) and ischemic stroke.

23.6% of our patients used nicotine in the form of chewing tobacco, nasal snuff, cigarettes and beedis. Our figures show increased mortality and morbidity in nicotine consumers compared to those who do not. ($p= 0.009$ statistically significant) Smokers both current and past have a higher risk of developing stroke was earlier quoted by Ruth (Bonita et al 1986)⁹.

In an Australian study Lefkovits¹⁰ of Royal Melbourne Hospital found that stroke type, age, cardiac disease and diabetes all independently worsen acute stroke outcome – this is similar to the findings in our Indian study.

However, Katedry I Kliniki Neurologii et al¹¹ in a Polish study in 2003 found that diabetes has no effect on the course and outcome of ischemic stroke. In contrast we found that in our Indian subcontinent diabetes is an independent risk factor by itself in increasing the morbidity.

Conclusions

The outcome of stroke essentially depends on the type of stroke, the severity and sub-type. However the morbidity and mortality of stroke, determined by the outcome after 4 weeks by the Modified Rankin Scale, is significant in elderly patients with diabetes and ischemic heart disease and smokers. The sex of the individual also did not alter the outcome. Hypertension and dyslipidemias did not alter the stroke outcome directly. An increased public awareness of the risk factors and their management not only leads to primary prevention of stroke, but also leads to lesser disability.

Analysis of combination of DM, HT and IHD and outcome showed p value of .003 which is statistically significant.

There is a linear trend indicating that a combination of risk factors increase the disability, morbidity, and mortality of stroke. However a larger study would be required to establish a definite association.

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Follow-Up Study of Amputees Using Below Knee Exoskeletal Jaipur Prosthesis with Total Contact High Density Polyethylene Socket

Dr MK Mathur, MBBS, MS (Ortho), Ex-Prof and Head, PMR, SMS Hospital, Jaipur

Dr Anupam Gupta, MBBS, MD (PMR), Research Associate

Bhagwan Mahaveer Viklang Sahayta Samiti, Jaipur

Abstract

100 cases of BK amputation who were provided with B-K Jaipur prosthesis with total contact socket, made up of high-density polyethylene sheet, using vacuum forming technique were followed up 6 months after receiving this prosthesis. All cases were living in urban or rural areas in and around Jaipur (This is for the convenience of the cases as well as to conduct study so that they can report back to the center when asked without problem)

84 Males and 16 female cases were given this prosthesis, age ranging from 18 yrs. to 52 years. Most common cause of amputation was road traffic accident.

Majority of the cases had had no complaints in negotiating architectural barriers or in carrying out activities of daily living (ADL). Alignment of the prosthesis with total contact socket was satisfactory with amputees could easily don and doff the prosthesis, no or minimum piston action in the swing phase was noted. Most of the cases used prosthesis for between 9-16 hrs./day without any discomfort. Average distance walked by amputees with prosthesis in single stretch was nearly 2 kms. ranging from 0.4 km. to 8 kms.

Pain (n=8), ulceration (n=9), instability and improper fitting (n=12), difficulty in donning and doffing (n=6) and soft socket immersed with perspiration (n=8), were few causes of dissatisfaction among the cases on follow up.

Overall most amputees were highly satisfied with this Jaipur prosthesis with total contact socket made up of high-density polyethylene sheet. Now this prosthesis has totally replaced the older conventional BK prosthesis with open-ended socket manufactured earlier in this center.

Key Words:

High-density polyethylene total contact socket, BK prosthesis.

Introduction

Total Contact sockets made up of high-density polyethylene sheet, using vacuum forming technique in B-K Jaipur prosthesis for B-K amputees has been a new concept in this center. Although in vogue in the western world, it was started in the center in the year 2000. Although follow-up was done of the amputees receiving this type of prosthesis, no extensive follow up study was done thus far. This study included 100 cases receiving this B-K Jaipur prosthesis with High-density polyethylene total contact socket. All patients were living in and around Jaipur. Cases were selected with the obvious purpose of

their convenience to report back to the center 6 month after receiving this prosthesis.

The prosthesis has been made considering habits of the amputees and environment and climate they face locally. Ideal B-K prosthesis should have following characteristics;

1. Length of prosthesis should be correct.
2. Static & dynamic alignment should be proper.
3. Easy to don & doff.
4. Antero-posterior and medio-lateral diameter of the prosthesis should be proper.
5. Height of anterior wall should be proper.
6. Minimum piston action during swing phase.

*Address for Correspondence: Dr MK Mathur, 304, Pratap Enclave, Bihari Marg, Bani Park, Jaipur 302016, India.
email: drmk1@yahoo.com*

7. Weight distribution of stump over proper areas of the socket.
8. Easiness in performing ADL & negotiating architectural barrier.
9. It should not be too heavy as to cause difficulty in walking and wearing for prolonged period.
10. No pain & ulceration at weight bearing areas of the stump.
11. Good cosmesis.

To look into all these attributes & level of patient's satisfaction with this Jaipur Prosthesis, was this study conducted in BMVSS, SMS Hospital, Jaipur.

Material and Methods

100 B-K amputees wearing B-K Jaipur prosthesis with total contact socket made up of high-density polyethylene sheet using vacuum forming technique, for more than 6 months were included in the study.

Inclusion Criteria

1. Uncomplicated, Unilateral below knee amputee.
2. Consent of the cases.
3. Who could report back to the center after 6 months.
4. Living in and around Jaipur

Exclusion Criteria

1. Bilateral amputees.
2. Unmotivated cases.
3. Cases, who could not come for follow up after 6 months.

Information was collected from the cases about their satisfaction with the prosthesis and results were drawn on the basis of the information.

Observation

Out of 100 amputees 84 were males and 16 females. Age of the amputees varied between 18-52 yrs. Most common cause of amputation was road traffic accident (n=64), followed by neurotrophic ulcers (n=15) and train accident (n=8). Most of the patients were given B-K prosthesis with HDPE shank (n=90). Mean length of the stump was 14.2 cm. Most of the amputees were self-employed (n=62) or doing private jobs (n=17). 13 out of 16 females were housewives. Mean weight of the prosthesis was 1.6 kg. 68 patients were given hard sockets whereas remaining 32 were given socket with soft insert for various reasons. Majority had conical shaped stump (n=72). Scars were non-tender in vast majority (n=94), healed in all cases, bones were bevelled in all cases & musculature was average (n=78) in most cases. Size of the stump was medium (34-67% of the sound side length) in most cases (n=78).

Table 1. Duration of PTB prosthesis with TCS using per day

<i>Duration (in hrs./day)</i>	<i>No. Of Cases</i>	<i>%</i>
0-4	8	8
5-8	14	14
9-12	48	48
13-16	29	29
17-20	1	1

Most of the patients used prosthesis for 9-16 hrs/day (n=77) without any discomfort (Table no. 1).

Table 2. Average distance covered in single stretch by amputee with new prosthesis

<i>Distance covered in single stretch (In kms)</i>	<i>No. of case with aluminium shank (n=10)</i>	<i>%</i>	<i>No. of case with HDPE shank (n=90)</i>	<i>%</i>
0-2	6	60	23	25.56
2-4	2	20	48	53.33
4-6	1	10	13	14.44
6-8	1	10	3	6.67

Average distance walked by the amputee was 2 kms. ranging from 0.4km to 8 kms. (Table no. 2).

Table 3. Effect of PTB prosthesis with total contact socket on ADL & Negotiating architectural barriers

<i>S. No.</i>	<i>Activity</i>	<i>No. of Amputees</i>			<i>Total</i>
		<i>Excellent</i>	<i>Good</i>	<i>Poor</i>	
1.	Squatting	40	48	12	100
2.	Sitting cross legged	62	30	8	100
3.	Running	21	64	15	100
4.	Standing on affected leg	40	48	12	100
5.	Walking on the plane	64	32	4	100
6.	Walking on rough terrain	60	32	8	100
7.	Walking on inclined surface	32	57	11	100
8.	Going up and down stairs	28	56	16	100

Effect of PTB prosthesis with total contact socket, on ADL & negotiating architectural barriers such as: steps/ staircase, walking on rough terrain, walking on inclined surface, was favourable & very few of them complained of any difficulties in such activities (Table no. 3).

Table 4. Alignment of the PTB prosthesis with total contact socket

S. No.	Alignment of prosthesis with patient wearing it	Correct	Incorrect	No. of cases
1.	Donning of prosthesis	92	8	100
2.	Patient comfortable while standing with heels 6" apart	98	2	100
3.	Length of the prosthesis	94	6	100
4.	A-P diameter of prosthesis	94	6	100
5.	M-L diameter of prosthesis	92	8	100
6.	Minimal piston action in swing phase	90	10	100
7.	Ht. of anterior, medial and lateral wall	100	0	100
8.	Weight distribution over proper areas of stump	96	4	100

Alignment of the PTB prosthesis with total contact socket, was satisfactory with majority had no difficulty in donning & doffing the prosthesis, length, A-P & M-L diameter of the prosthesis, weight distribution over proper areas of the stump, no or minimum (< 3 mms) piston action (Table No. 4).

Table - 5. Causes of dissatisfaction with PTB prosthesis with total contact socket

S. No.	Causes of dissatisfaction	No. of Cases (n=100)	%
1.	Prosthesis heavy		
	Aluminium	2/10	20
	HDPE	5/90	5.56
2.	Pain	8	8
3.	Ulceration	9	9
4.	Instability and improper fitting	12	12
5.	Difficulty in donning & doffing	6	6
6.	Poor cosmesis	11	11
7.	Soft socket immerse with perspiration	8/32	25
8.	Breakage in foot	6	6
9.	Broken or cracked socket	9	9

Prosthesis heavy, pain & ulceration, instability and improper fitting, poor cosmesis, soft socket immersion

with perspiration, were few causes of dissatisfaction in few cases. They were properly taken care of in the follow-up alignment of the PTB prosthesis with total contact socket, was satisfactory with majority had no difficulty in donning & doffing the prosthesis, length, A-P & M-L diameter of the prosthesis, weight distribution over proper areas of the stump, no or minimum (<3 mm) piston action (Table No. 5).

Discussion

Fitting of total contact sockets made up to high-density polyethylene sheet using vacuum forming technique with B-K prosthesis to the B-K amputee has been in progress since the year 2000. Nearly 1000 amputees have been fitted with this prosthesis since then.

In the present study 100 unilateral B-K amputees, living in and around Jaipur who could report back to the center after 6 months of receiving prosthesis, were fitted with B-K prosthesis with total contact socket. Male / female ratio in the study was 5:1. As males are mostly involved in outdoor activities and females lead a comparatively sheltered life, this ratio is expected. Majority of the patients belonged to the 21-40 yrs. age group (n=81). As the data show that this age group is most mobile & active as they have to shoulder the responsibility of the family & socialize and hence they are more exposed to injuries.

Road traffic accident was the most common cause of amputation among the cases (n=64). As has been proven in some previous studies, RTA remains the most common cause of B-K amputation in India. Present study also corroborated this observation.

Mean weight of the prosthesis was 1.6 kg. When the manufacturing was started of this type of prosthesis in the center, the mean wt. of the prosthesis used to be 1.8 kg. After making few adjustments in the trimming of socket & shank, this has been reduced to 1.6 kg. and fewer patients are complaining about the weight of the prosthesis. Most of the complainers were wearing old conventional prosthesis, which was lighter than this prosthesis. So they took some time to get 'used to' to the newer prosthesis.

32 out of 100 patients were given soft inserts. Diabetes, Leprosy (n=6), neurotrophic ulcers or too many bone prominence were the reasons for providing this soft insert in the socket. Immersion of the ethaflex soft insert with perspiration was a frequent complaint (25%). They were instructed to wear cotton stockinettes in case they have difficulty coping with the wet soft insert. Their soft inserts were replaced with new soft inserts in the follow up.

90 out of 100 patients had been provided with HDPE shank. This center has abandoned manufacturing aluminium shanks. 10 patients, who were used to wearing older aluminium shank prosthesis, insisted that they are

more comfortable wearing this older prosthesis with total contact socket & requested not to change it to HDPE.

Majority of the amputees (n=77) wore prosthesis for between 9-16 hrs./day. On the average amputees had utilized this prosthesis for more than 10 hrs. / Day. This figure speaks very highly in favour of the usefulness and comfort of the prosthesis as the amputees were not using this prosthesis merely for cosmetic purpose but it was useful to them functionally also.

The walking distance covered by most of the amputees in single stretch in the study, varied between 0.4 km to 8 kms. As most of the patients have already had the experience of walking with their older prosthesis, they have not had any difficulty in adapting to this newer, heavier (by 200 – 400 gms.) prosthesis. Energy consumption is directly proportional to the weight of the prosthesis, so heavier the prosthesis, more energy consumed in the walking and lesser distance covered in the single stretch. As this prosthesis provides better proprioception, better fitting of the socket and better alignment of the prosthesis to the user, the walking distance covered in single stretch actually increased with this prosthesis.

In Indian conditions no prosthesis can be accepted by the patient, which interferes with squatting or cross-legged sitting. As Jaipur foot was incorporated in these B-K prosthesis majority of the amputees had no difficulty in doing these activities.

The Jaipur Foot helps a great deal in walking on rough terrain & walking on inclined surfaces with its attributes of dorsiflexing at ankle (required in squatting & walking on inclined surface), adduction and supination of forefoot, inversion of heel and transverse rotation at the foot shank joint (required in cross legged sitting), inversion and eversion of foot (required for walking on rough terrain). No patient had difficulty in walking on plain surface and standing on the affected leg.

In majority of the patients, alignment between various components of prosthesis was very satisfactory because of the simple in-production alignment systems being used. Almost all patients were able to stand comfortably with heels 6" apart. Donning & doffing was convenient in majority. Length of the prosthesis, Antero-Posterior and Medio-Lateral diameter of the prosthesis were correct & there was no or minimum (< 3mm) piston action in the swing phase.

7 patients complained that the prosthesis was heavy, in the follow-up. 5 out of these 7 were 'first timers' with the prosthesis. No amputee complained that this new prosthesis hindered his or her day-to-day activities; it rather enhanced their ADL, because of a very close stump socket interface.

8 cases complained of pain & 9 cases came with ulceration in the stump on walking with this prosthesis, in the follow up. It was because of improper alignment and friction between skin of the stump and socket of the prosthesis. It was immediately corrected by using heat gun over pressure points in the socket & cases had no such complaints later. 6 patients complained improper fitting, difficulty in donning and doffing of prosthesis. Main causes were with the incorrect height of the socket wall or improper weight distribution in the socket. Trimming the socket wall and using heat gun to correct weight distribution of the stump in the socket corrected these.

8 patients complained excessive sweating and immersion of soft inserts with perspiration in the socket. It was specially noted in the summer months. It is expected in the hot climate of Rajasthan with temperature hovering around 45° C in summer. These patients were indulged in outdoor activities in the daytime. They were advised to wear one or more cotton socks to avoid discomfort while at home or come to the center for change of soft insert.

9 patients came with cracked or broken sockets in the follow up. No particular pattern or site was noted on examination and reason for this break down could vary from faulty weight distribution in the socket, too much weight of the patient, fall of prosthesis from height to fatigue wear of the socket material.

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Prevalence and Determinants of Disability in the Rural Elderly Population in Northern India

Dr Anil Goswami¹, PhD, Supervising Medical Social Service Officer

Dr VP Reddaiah¹, MBBS, MD (Comm. Med), Professor and Head

Dr SK Kapoor¹, MBBS, MD (Comm. Med), MD (Ped), Professor

Dr Bir Singh¹, MBBS, MD (Comm. Med), Professor

Dr U Singh², MBBS, DPMR, DNB (PMR), Professor and Head

Dr AB Dey³, MBBS, MD (Med), Professor

Dr SN Dwivedi⁴, PhD, Additional Professor

Dr Guresh Kumar⁴, PhD, Scientist

¹ Centre for Community Medicine, ² Dept. of Physical Medicine & Rehabilitation, ³ Dept. of Medicine,

⁴ Dept. of Bio-Statistics, All India Institute of Medical Sciences (A.I.I.M.S) New Delhi-110029, India

Abstract

Study Objectives: To study the prevalence of impairment in a rural elderly population in India and its association with age, gender and other selected variables.

Design: Cross sectional study

Setting: Intensive field practice area of Comprehensive Rural Health Services Project Ballabgarh in distt. Faridabad, Haryana, a rural field practice area of Centre for Community Medicine, All India Institute of Medical Sciences, New Delhi.

Subjects: All people who had completed 60 years of age at the time of interview.

Methods: The study sample was selected using stratified random cluster sampling. Impairment was assessed by using Lachs scale, except for vision assessment, where instead of Jaeger Card; finger counting at a distance of 3 meters for each eye separately in good day light method was applied.

Results: Out of the 1117 aged a total of 987 (88.4%) could be interviewed. Among these, 490 (49.6%) were males and 497 (50.4%) were females. About four-fifth (81.6%) of them were illiterate. One-fifth of the males and half of the females were widowed. Most (78.2% males & 86.1% females) of the aged were having one or the other health problems. Forty-eight percent of the elderly had at least one impairment. Impairment increased with age and was more common among females. Visual impairment was the most frequently observed. In the functional assessment, 23.6% of the subjects were blind in one eye and 16.4% were blind in both eyes. 11% were observed to have hearing impairment. About 9 % had impairments of arm functions. When tested for leg function, 1.5% of the aged were not able to move, mostly both legs. On logistic regression, impairment was positively associated with age, illiteracy, loss of interest, chronic health problems, cognitive defect, and not gainfully employed.

Conclusion: Impairment is an important health problem among elderly in rural area of northern India. There is a need to provide appropriate and comprehensive service; so as to enable the elders to realize their full potential and lead a healthy and happy life.

Key Words: Aged, Rural, Impairment, Disability.

Introduction

The increase in number of elderly people has been observed as a result of many contributing factors i.e. a significant decline in the number of babies born, increase

in life expectancy, which is simultaneously attributed to advancement in medical treatment and technology, prevention and eradication of many infectious diseases and improved nutrition, hygiene and sanitation. With the increased life expectancy, the health conditions of the people in their later stage have been observed to be worsening. Illnesses and injuries along with degeneration of body organs also result in hospitalisation or decreased

Address for Correspondence: Dr. Anil Goswami Supervising Medical Social Service Officer Centre for Community Medicine All India Institute of Medical Sciences New Delhi-110029 E-mail: anilgoswami55@hotmail.com

activity, which may subsequently lead to disability or dependence. Since the consequences of the disability can seriously affect the economic, social, and psychological aspect of life of older persons with disability and also their families and the communities as well, it is found to be a major health concern among older people. In a nation-wide survey¹, prevalence of various types of physical disabilities in rural elderly was found to be quite high (40%). The highest prevalence rate (47%) of disability was observed in Andhra Pradesh and a lowest of 32% in Haryana.

Problems of eyes are one of the most common health problems in the elderly. Visual impairment is found to be most prevalent (27%)¹. In various community based rural studies, visual problems including poor eyesight and cataract have been reported to range from 7% to 91%^{2,3,4,5,6,7,8,9,10}. The prevalence of hearing impairment increases with advancing age and approaches 60% during the ninth decade¹¹. Most hearing loss in the elderly is of the sensorineural type, including presbycusis. Conductive hearing losses are less common. An important treatable cause of hearing loss is cerumen impaction, which is found in up to 30% of elderly people¹¹. At national level, NSSO 52nd round 1995-96¹ had reported hearing disability to be 15%. One of the curses of old age is immobility due to illness or disease. Locomotor disability has been reported in 11% among the elderly, without any gender difference¹.

In this study, as well as in most surveys referred to in this study, conducted elsewhere, the definition of impairment and disability has been used loosely and interchangeably, therefore, it should not be viewed strictly or critically.

Methods

This study was conducted in Intensive Field Practice Area (IFPA) of Comprehensive Rural Health Services Project (CRHSP) Ballabgarh in district Faridabad (Haryana). This is a rural field practice area of Centre for Community Medicine (CCM), All India Institute of Medical Sciences (AIIMS), New Delhi. The period of data collection was between January 1998 to December 1999. Twenty-eight villages with a population of 69,995 are covered by IFPA. Two Primary Health Centres (PHC) Dayalpur and Chhainsa provide health services, covering 8 Sub-Centres (SC) which includes two PHC sub centres. The demographic data of this population is stored electronically in a database, which is updated regularly. The sample was selected using stratified random cluster sampling. To take a representative sample, Sub-centres were stratified on the basis of availability of health facility i.e. PHC Sub-centre (2) & Non PHC sub-centres (6). Sample sub-centres were selected randomly by draw of lots i.e.

- One sub-centre out of the 2 PHC sub-centres
- One sub-centre out of the 6 non-PHC sub-centres.

All the villages in selected two sub-centres were included in study. Each village served as a cluster and all the aged people in these villages were studied. This was a cross-sectional study of people, who had completed 60 years of age and had been resident of area for at least six months. A computerized list of elderly population was obtained from computer database of study area. Additional cases were identified with the help of health workers and by the investigator. If elderly were found to be absent on one visit, another visit was made within 7 days. If they could not be contacted despite two visits, then they were excluded from the study. Personal interviews were conducted in their local language by the researcher in the homes of the respondents. An informed verbal consent from each participant was taken. When necessary, subjects were referred for further examination/investigation and treatment. The approval of the ethics committee was taken for carrying out this study.

The data was collected using semi-structured interview schedule adapted from standardized schedules (Pareek, 1981; Andrews, 1992)^{12,13}. Detailed informations were collected regarding basic demographic-characteristics, current and past health problems, living conditions, health care practices, and use of medication and health care needs. Recall period for self-reported health problems was of one month and of chronic health problems covered the last one-year. Problems were recorded on the basis of self-report or history or examination or available records. Single investigator performed all the interviews and measurements.

The data was analyzed using Epi Info 6.04 d and SPSS version 7.5 software. For comparing of proportions, Chi-square and Fisher Exact test were used. Logistic regression was used to find out the various risk factors for disability.

Measurement of functional status was performed by using procedures prescribed by Lachs et al (1990) (with some modification) for general screening of functional disability in the elderly¹⁴.

Vision was tested by finger counting (vision-with or without spectacles depending on whether the subjects were using spectacles or not) at a distance of 3 metres for each eye separately in good daylight. Person's vision was recorded as 'able to count' or 'unable to count' at this distance (i.e. vision equal to or better than 3/60 or worse than that). This is in consonance with the WHO definition of blindness (WHO 1979).

For assessing hearing, simple questions (e.g. what is your name? or where do you live?) was whispered from behind the head. To check for hearing disability, the investigator

stood 12 to 24 inches behind the patient, covered one ear, and whispered the words in the uncovered ear, which were repeated by the patient. Person's hearing was recorded as 'able to hear' or 'unable to hear'. Those who were unable to hear were referred for ENT consultation.

Arm function: Proximal function was assessed by ability of the participants to touch the back of the head. Asking the respondent to pick up a spoon assessed distal function. A study subject was designated as having abnormal results in case of inability to do the task.

Leg function: The respondent was asked to rise from the cot/chair, walk a distance of 10 feet, return and sit down. Inability to walk or transfer out of cot/chair was designated as abnormal result or disabled.

Results

The present study was conducted in 7 selected villages with a total population of 17,795. There were 1,117 aged (>60 years) in this population, comprising 6.3% of the total population. Out of these 987 (88.4%) could be interviewed. Only 12 (1.1%) people refused to co-operate and rest 118 (10.5%) could not be contacted, the reason being, either they had moved away or had died since inclusion in the database. Of the 987 subjects included in this study, 49.6% were males. Majority of the aged were illiterate (81.6%), living in joint families (82.9%), belonging to lower socio-economic status (48.8%), living with spouse and children (56.0%). In general females were more likely to be illiterate (99.0% vs. 63.9%), widowed (49.7% vs. 20.4%), living alone (4.2% vs. 1.0%), having son as a head of household (51.3% vs. 27.8%), and not working (74.4% vs. 54.5%).

Physical impairments (observed)

Results of observed disabilities on testing are presented in Table 1.

Vision : Visual impairment was the most frequently observed. In the functional assessment when vision was tested using finger counting at 3-meter distance, 23.6% of the subjects were found blind in one eye and 16.4% in both eyes.

Hearing : 11% were observed to have hearing impairment. 4% of the respondents were not able to hear with one of the ears, while 7% could not hear in both ears.

Arm function : Nearly 9 % had impairment of functions of arms. 2.9% subjects were observed to have impairment in proximal functions of one arm only, whereas

2.7% suffered impairment of the function in both arms. The distal arm function impairment was observed in 1.8% of the aged in one arm and 1.4% in both arms.

Leg function: When tested for leg function, 1.5% of the aged were not able to move mostly both legs.

TABLE 1: Physical impairment of the respondents on testing (n = 987)

Impairment	Rt. only No. (%)	Lt. only No. (%)	Both No. (%)	Total No. (%)
Vision	98 (9.9)	135 (13.7)	162 (16.4)	395 (40.0)
Hearing	18 (1.8)	22 (2.2)	69 (7.0)	109 (11.0)
Arm Function				
Proximal	12 (1.2)	17 (1.7)	27 (2.7)	56 (5.7)
Distal	7 (0.7)	11 (1.1)	14 (1.4)	32 (3.2)
Leg Function	1 (0.1)	0 (0.0)	14 (1.4)	15 (1.5)

Prevalence of impairment in relation to age and gender are presented in Table 2.

TABLE 2 : Distribution of the Respondents by Age, Gender and Type of Impairment

Age Group		Vision	Hearing	Arm Function	Leg Function
				P	D
Males	N=	No. (%)	No. (%)	No. (%)	No. (%)
60-64	126	26(20.6)	6(4.8)	0 (0.0)	1 (0.8)
65-69	114	28(24.6)	2(1.8)	5 (4.4)	2 (1.8)
70-74	117	49(41.9)	11(9.4)	5 (4.3)	6 (5.1)
75+	133	66(49.6)	20(15.0)	8 (6.0)	7 (5.3)
Total	490	169(34.5)	39(8.0)	18 (3.7)	16 (3.3)
Females					
60-64	179	51(28.5)	13(7.3)	10 (5.6)	1 (0.6)
65-69	133	66(49.6)	15(11.3)	7 (5.3)	6 (4.5)
70-74	103	56(54.4)	20(19.4)	11 (10.7)	4 (3.9)
75+	82	53(64.6)	22(26.8)	10 (12.2)	5 (6.1)
Total	497	226(45.5)	70(14.1)	38 (7.6)	16 (3.2)

Amongst study population, visual impairment was observed in 34% of the males and 45% of the females. In all age groups, women had higher prevalence of visual impairment than men. There was an increasing trend with age in both genders. Visual impairment was found to be significantly associated with age ($p<0.001$) and gender ($p<0.001$).

The hearing impairment was also higher among women, as was the case in visual impairment. The prevalence was twice as high in females than in males. An increasing significant trend ($p<0.001$) was observed in all age groups amongst men (except in 65-69 age group) and women.

The proportion of women having proximal arm impairment was twice 38 (7.6%) that of men 18 (3.7%) and was found to be significant ($p=0.005$). Impairment in arm function did not have increasing prevalence with age.

The distal arm function impairment was similar in both males and females. There is an increasing trend with age in males only.

Leg function impairment had low prevalence but was higher in females than in males (2% in females and 1% in males) and had no trend with age in males but was observed in females. These differences are not significant.

Impairment determinants: The determinants of impairment were analyzed by multivariate analysis (logistic regression). For this, impairment was converted into a binary variable, impaired and not impaired. Being impaired meant presence of any one or more of visual, auditory or locomotor impairment. No impairment means having none of the three impairments. Wherever necessary, dummy variables were created. The results of this analysis in the form of crude odds ratios are shown in Table 3.

The variables which were found to be significantly associated after preliminary bivariate analysis with impairment were: Age, female sex, illiteracy, married, widowed, dependency, smoking, tobacco chewing, alcoholic intake, satisfaction with life, sleep problems, lost interest, sad or depressed, worried, depressed, dependent in ADL, chronic problems, poor perceived health status, cognitive defect, not employed gainfully. However widowed, family type, socio-economic status, other addictions, living alone and BMI<18.5 & BMI>25.0 were not found to have significant effect on impairment in the bivariate analysis.

For multivariate analysis (logistic regression) only those variables found significant in bivariate analysis were included. The variables in the model correctly classified 67% of the cases. The adjusted odds ratios are shown in Table 4.

TABLE 3. Determinants of impairment among Aged, (Bivariate Analysis)

<i>Variables</i>	<i>Crude Odds Ratio</i>	<i>CI</i>	<i>P</i>
Age: >75 years			
<75 years*	2.67	1.92-3.73	<0.001
Sex: Females			
Males*	1.75	1.35-2.28	<0.001
Literacy: Illiterate			
Literate*	2.73	1.89-3.95	<0.001
Marital status: Widowed			
Married*	0.61	0.47-0.80	<0.001
Family: Nuclear			
Joint*	0.82	0.58-1.17	0.25
SES: Lower	1.16	0.9-1.67	0.41
Middle	1.05	0.72-1.53	0.82
Upper*			
Dependency: Dependent	2.68	1.84-3.91	<0.001
Non-dependent*			
Smoking: Smoker			
Non-smoker*	0.73	0.56-0.95	0.02
Chewing Tobacco	1.80	0.98-3.34	0.04
No tobacco chewer*			
Alcohol: Alcoholic	0.29	0.16-0.51	<0.001
Non-alcoholic*			
Other Addiction	3.30	0.60-24.70	0.17
No other addiction*			
No Satisfaction with life	1.64	1.19-2.25	0.002
Satisfaction with life*			
Sleep Problem	1.63	1.25-2.12	<0.001
No sleep problem*			
Lost Interest	2.29	1.75-3.01	<0.001
No lost interest*			
Sad or Depressed	1.87	1.39-2.50	<0.001
Not sad or depressed*			
Worried	1.54	1.16-2.05	0.002
Not worried*			
Depression	1.55	1.19-2.01	<0.001
Not depressed*†			
Living Alone	0.68	0.28-1.60	0.33
Living with others*			
ADL Dependency	7.58	3.80-15.49	<0.001
Not dependent on ADL*			
BMI<18.5	1.15	0.89-1.49	0.29
BMI>25.0	0.78	0.42-1.49	0.43
BMI Normal 18.5-25.0*			
Chronic Problems	2.18	1.50-3.15	<0.001
No chronic problems*			
Cognitive Defect	2.69	1.87-3.85	<0.001
No cognitive defect*			
Not Working	2.46	1.85-3.27	<0.001
Working*			
Perceived Health Status:			
Not Healthy	1.97	1.48-2.61	<0.001
Healthy*			

* Reference category, †as per scale used

TABLE 4 : Determinants of Impairment by Step Wise logistic regression

<i>Variables</i>	<i>Adjusted Odds ratio</i>	<i>CI</i>	<i>P-value</i>
Age>75 years	2.07	1.46-2.94	<0.001
Illiterate	2.0	1.36-2.94	<0.001
<i>Alcohol</i>	<i>0.40</i>	<i>0.23-0.71</i>	<i><0.01</i>
Lost interest	1.63	1.23-2.17	<0.01
ADL	3.92	1.99-7.73	<0.001
<i>Chronic problem</i>	<i>1.74</i>	<i>1.19-2.55</i>	<i><0.01</i>
<i>Cognitive defect</i>	<i>1.72</i>	<i>1.18-2.5</i>	<i><0.01</i>
<i>Not working</i>	<i>1.46</i>	<i>1.08-1.98</i>	<i><0.01</i>

The variables which were associated positively with impairment were: Age>75 years, being illiterate, having lost interest, being dependent on ADL, having chronic problem, having cognitive defect and not working.

Significant negative association of impairment was found with alcohol consumption. This may be because some of the alcoholic respondents might have died.

Discussion

The prevalence of various types of impairments was found to be high (47.8%) in the present study. In the Nation-wide survey¹ (NSSO 52nd round 1995-96) also, the prevalence of various types of physical disabilities in rural area was found to be high (40%) amongst elderly, though in Haryana state¹, it was reported to be slightly lower (32%). The possible reason for higher impairment in this study was that the presence of impairment was reported both unilateral and bilateral, where as in NSSO 52nd round, only bilateral disabilities were reported. Physical disabilities were reported in 13.8% of the aged in Rohtak study¹⁶, which may be low due to methodological reasons.

In the present study, impairment was observed more in females compared to males. NSSO 52nd round 1995-96¹ also reported a higher prevalence of disability among females than males for whole country, as well as in Haryana.

In the present study, the prevalence of impairment increased with age and was higher among females. Similar findings were reported by other studies from United Kingdom¹⁷ and Japan¹⁸. A higher impairment amongst females could be probably due to combination of factors like poor nutrition status, poor access to health care, higher incidence of osteoporosis and fractures, postmenopausal status etc.

Visual impairment was the most frequently observed impairment in the present study. When vision was tested using finger counting at 3-meter distance, a little over 40% of the subjects were blind at least in one eye. NSSO

52nd round 1995-96¹ reported a lower figure of 27% of the respondents suffering from visual impairment on clinical examination (a person who can't count fingers of a hand with spectacles if using, from a distance of 3 meters in good daylight with both eyes open). In the present study 16.4% of subjects were bilaterally blind. The prevalence of bilateral blindness was a little higher than that reported (12.8%) on clinical examination (Visual acuity <6/60) by Murthy et al.¹⁰ In a study by Grover³ nearly 69% of the elderly had visual impairment. Cataract was observed to be responsible for the majority of cases on clinical examination.

The prevalence of visual impairment in the present study was found higher among females than males. NSSO 52nd round 1995-96¹ and Grover³ have also reported similar results. The reason was probably due to tendency of early health seeking behaviour in men as compared to women and also exposure to smoke in cooking places to which women are more exposed. In this study visual impairment was found also to increase with age both among males and females.

Hearing impairment was observed in 11% of the study subjects in the present study. A higher prevalence (15%-18%) was reported in some rural community-based studies^{1,16, 19}. Even higher prevalence of hearing impairment (46%) was reported by Vijaya Kumar S (1996)⁸. Hearing impairment in the present study as well as in NSSO 52nd round 1995-96¹ was almost found similar, while the possible reason for higher proportion in Lal, Grover, Sarna et al. and Vijaya Kumar S (96)^{16,3,19,8} studies may be its subjective assessment. As compared to the present study, a higher prevalence of hearing impairment was reported (whisper voice test) among aged in Saudi Arabia²⁰, Malayasia²¹ (evaluated by interview, no audiometry) and USA²².

In the present study hearing impairment was found to be more among females compared to males. Some other community based rural studies^{3,16} including the one at national level, NSSO 52nd round 1995-96¹ have also reported hearing disability to be higher among females as compared to males. In the present study hearing impairment also was found to increase with age both in males and females.

Difficulties in mobility can lead to isolation of the elderly. In the present study, 1.5% of the aged were bed ridden. However, Dandekar²³ reported that 5% of the old persons in rural and urban areas of India (about 4% men and 7% women) were physically immobile. Arm and leg impairment was found to be 10.4% among aged. The proportion was higher in females than males. This may be due to higher proportion of falls reported in females in this study. Similar findings (11.1%) in rural India were reported in the NSSO 52nd round report¹.

Responses to close-ended question about mobility revealed that 51.8% of the elderly had some difficulty in mobility/walking. Lal¹⁶ reported restricted mobility in 33% of the aged. Grover³ reported a prevalence of orthopaedically handicapped to be 40% in rural Delhi. In the present study the higher proportion of women (62.6%) reported difficulty in movement as compared to men (59.0%). Antilla et al.²⁴ also reported higher percentage in women than in men, though the overall prevalence was low.

The factors which were found significant associated on multivariate analysis were elderly greater than 75 years, illiterate, not working, who had lost interest in their life and experiencing cognitive defect and were dependent on ADL due to chronic problems.

Conclusions

Disability is an important health problem among elderly in rural area of northern India. There is a need to provide appropriate awareness, comprehensive and accessible services, so as to enable the elders to realize their full potential and lead a comfortable, healthy and happy life. The mobile health clinics equipped with these facilities may be a solution.

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What Gait Analysis Tells us About Clinical Examination of Spastic Gait in Children.

Dr Ashish S Macaden, DNB (PMR), Reader

Dr Suranjan Bhattacharji, MS(Orth), DNB (PMR), Professor and Head

Er. Richard KR Chilman, MSc, B.Eng, MIEE, Biomedical Engineer

Ganesh T, MSc, Clinical Gait Analyst

Dr Jacob George, DNB (PMR), Lecturer

Er. NG Nair, ME, Engineer*

Department of Physical Medicine & Rehabilitation, Christian Medical College Vellore, TN 632004.

* Indian Institute of Technology - Madras, Chennai.

Abstract

Data from computerised gait analysis in the important stance period of spastic and normal walking are compared. This data is interpreted in the context of clinical examination of walking in a child with Cerebral Palsy.

Method: Stance period measurements of unaided walking in 33 children with spastic CP are compared with 20 normal measurements.

Results: Spastic gait is characterised by shorter stride length, excessive knee flexion and increased side to side forces in stance. Though walking speed was significantly slower, time spent on one leg and maximal hip and ankle movements are not significantly different within each walking cycle.

Discussion: Spastic gait affects side-to-side stability and knee extension during stance. These are key clinical observations to be made when a child with spastic CP walks into the consulting room. As the key muscles in this phase are the antigravity hip and knee extensors, this observation can lead to practical interventions as well (e.g. hip and knee extensor strengthening).

Key messages: Spastic gait affects side-ways stability and knee extension during the period of walking cycle when the body is on one leg. Identifying this as the child walks in provides the clinician with specific goals for intervention.

Introduction

Computerised gait analysis is useful in the individual child with Cerebral Palsy (CP) ¹⁻⁵ and is helpful in planning interventions in spastic gait ^{3,4,6-9}, but is expensive and often inaccessible. It is prone to providing the clinician with information overload. But gait analysis provides clinicians with useful patterns ^{10,11}.

This report interprets the results of gait analysis for clinical examination. The clinician can put gait patterns identified by gait analysis to clinical use by looking for these key events in gait while observing a child walking into his consulting rooms. Therefore we present a selection of gait deviation measurements to improve clinical skills of examination of spastic gait.

Methods

Ambulant 5 to 15 year old children with spastic CP - both diplegia and hemiplegia - who presented to the outpatient clinic of Physical Medicine and Rehabilitation over a period of four years were consecutively selected for this study at the completion of their gait training program after obtaining consent. They were evaluated clinically and gait was then recorded by videographic and instrumented gait analysis methods.

Similarly, 6 to 14 year olds without gait abnormalities who volunteered to undergo gait analysis from a neighbouring community were evaluated.

Equipment used was Selspot's kinematic system, Kistler's 500 mm² force plate and Motion Labs' MA100 dynamic EMG system. Selspot measures *kinematic* data (stride length, stride time, percentage of stance and swing,

Address for correspondence: Ashish S. Macaden Reader, PMR, CMC Vellore 632004, Tamilnadu. email: macaden@cmcvellore.ac.in

walking speed, degrees of individual joint movements) using 3 infrared video-cameras to record from 8 infrared LEDs placed over bony markers on the leg. The force plate concealed in the walkway measured *ground reaction forces* in vertical, forward and lateral directions from the single foot strike made by the subject on it. Walking *EMG* recordings from 4 muscle pairs were collected by surface electrode preamplifier units but this data is beyond the scope of this brief report.

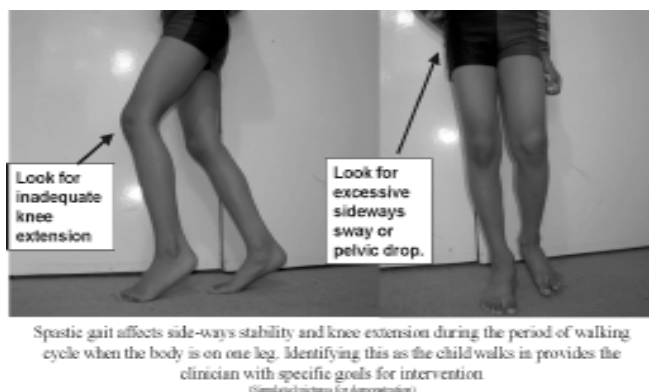
Statistical analysis was done using the Student t test with unequal variance and the Chi-square test using SPSS and MS Excel software.

Results

34 children with spastic CP, 22 with diplegia and 12 with hemiplegia were selected. Data was collected from 49 limbs. 20 collections were taken from lower limbs of the 20 normal child volunteers. There were 4 dropouts from the CP group: one due to presence of ataxia, one due to poor quality of gait recordings and two due to corruption of stored data.

The age and sex distribution of both groups were not significantly different. The mean height of CP children (132 cm) was significantly higher than the normals (111 cm; $p=0.016$). Despite this, the normalised stride length and walking speed in CP children was significantly lower than the normal children (0.005 Vs 0.008; $p=0.000$).

The knee could only reach 15 degrees short of full extension in stance in spastic gait while managing



significantly more (2 degrees short of full extension; $p=0.003$) in normal children's group. Analysis of ground reaction forces showed that while there was no difference in vertical and forward forces, there was a significant increase in normalized lateral forces (77% vs. 33%; $p=0.000$). There was a significant slowing down of walking speed (36 vs. 48metres/minute; $p=0.011$) which correlated with decreased stride length (65 vs. 84cm; $p=0.006$) but not affecting the proportion of time spent in stance or single limb support (33% vs. 39%; $p=0.039$).

TABLE 1: Stance data of spastic and normal gait

<i>Gait Parameter (Mean; Std deviation)</i>	<i>CP children</i>	<i>Normal children</i>	<i>P</i>
1. Age (years)	10+4	9+2	0.97
2. Sex(M:F)	23:11	14:6	0.85
3. Height (cm)	59+ 67	100+46	0.015*
4. Stride length (m)	0.65+0.25	0.84+0.18	0.006*
5. Normalized stride length (by height)	0.005+0.002	0.008+0.002	0.000*
6. Walking speed (m/min)	36+18	48+15	0.011*
7. Single limb stance % of walking cycle	33+11	39+11	0.039
8. Stance % of walking cycle	58+11	55+9	0.184
9. Maximum hip extension in stance (degrees)	4 flexion+14	1.5+ 6	0.09
10. Maximum knee extension in stance (degrees)	15 flexion+ 17	2 flexion+3	0.003*
11. Maximum ankle plantarflexion in stance (degrees)	9+12	13+9	0.23
12. Normalised Vertical ground reaction forces (% body weight)	104+37	109+32	0.573
13. Normalised forward ground reaction forces (% vertical force)	12+6	16+7	0.029
14. Normalised lateral ground reaction forces (% forward force)	77+46	33+20	0.000*

* Statistically significant differences

Discussion

In the walking cycle, the lower limb is most challenged when it is supporting the body (stance) and especially when it is doing so alone, without the support of the other limb – the single limb support phase of stance (SLS). That is why this report targets this phase of the walking cycle. In spastic gait, an attempt to maintain the time spent in this phase is observed. However this time is maintained at the cost of the way the limb copes during stance i.e. there is a decrease in stride length, knee extension and increased lateral forces (more simply put - a wobbly or side to side force). Interestingly, there is no significant effect on sagittal angles of the spastic hip and ankles in stance.

These findings would direct the clinician's eye away from the side view of the hip to the front or back view of the pelvis to observe sideways instability in single limb stance.

If there is a sideways instability observed in the single limb support phase of stance, as evidenced by excessive swaying or dropping of the pelvis, the clinician would target the glutei muscles for strengthening and the adductor muscles for decreasing spasticity.

Also, the results of this study directs the clinician's eye away from the side view of the ankle towards the side view of the knee, to observe inadequate extension in single limb stance. If discovered, the goal would be to strengthen the knee extensor muscles and decrease spasticity in the knee flexors.

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Adolescent Osteomalacia: A Case Report of Five Years Follow-up.

Dr. A. K. Agarwal, MBBS, MS (Ortho), Professor Deptt. of Physical Medicine & Rehabilitation, K.G's Medical University, Lucknow

Abstract

Nutritional disabilities are of major concern in early childhood and in adolescence which may lead to short stature and various deformities if not detected in the early stage. The adolescent age group is particularly prone to nutritional rickets / osteomalacia due to increased demand for nutrients, especially calcium and vitamin D. One such case of a young girl is being reported with five years of long follow-up with the aim to emphasize that early detection of this lesion is essential for good prognosis and such cases can be successfully treated even without POP immobilization and surgery.

Key Words: Osteomalacia, adolescent

Case Report

A young girl aged 16 years, unmarried, R/O Lucknow, attended OPD of Department of Physical Medicine and Rehabilitation, K.G's Medical University, Lucknow, in November 1999 with chief complaints of severe pain in lower back and inability to stand or walk for the last few months. There was no history of even mild injury. She belonged to low socio-economic status in Muslim community where PURDAH is still a social custom. On examination she was having acute spasm in both hips and lumbar area. She was unable to stand / walk and straight leg raising (SLR) was not possible on either side. Local tenderness was present in both Scarpa's triangle. Her blood chemistry revealed low serum calcium, serum phosphorus and Alk. Phosphatase was very high. The skiagram of pelvis with both hips showed bilateral incomplete fracture in neck of femur, bilateral pseudo fractures (Looser's zone) in superior and inferior pubic rami and generalized rarefaction in the bones (Fig. 1). Skiagram of lumbo-sacral spine showed generalized rarefaction and fish body appearance in the vertebral spaces. The young girl was advised absolute bed rest, plenty of milk and milk products, vitamin D and calcium supplementation along with daily sunlight exposure for at least one hour in the morning. The plaster was not given. Suitable analgesics were given for 10 days to reduce acute pain and spasm. Although within 3-4 weeks her pain was reduced but absolute bed rest was continued for 12 weeks, followed by gradual weight bearing exercises. Her raised Alk. Phosphatase was decreased and serum calcium and phosphate also came to normal

Address for Correspondence: Dr AK Agarwal, Professor, Deptt. Of Physical Medicine & Rehabilitation, K.G's Medical University, Lucknow – 226 018, India. E-mail : drashokagarwal@yahoo.com



Fig. 1 The skiagram of pelvis with both hips showed bilateral incomplete fracture in neck of femur, bilateral pseudo fractures (Looser's zone) in superior and inferior pubic rami and generalized rarefaction in the bones



Fig. 2. Her recent skiagram of pelvis with both hips (after 5 years) shows no signs of pseudo fractures

range. The full weight bearing started after 14 weeks when her skiagram showed marked healing in areas of multiple pseudo fractures.

Incidentally she reported in our OPD again after exactly five years with no sign / symptom of previous illness. She was totally cheerful and doing all her household activities of daily life like squatting, cross legged sitting,

standing, walking and running etc. Her recent skiagram of pelvis with both hips (after 5 years) shows no signs of pseudo fractures (Fig. 2). The appearance of triradiate pelvis which is very common in adult osteomalacia in females was not seen in this young girl.

Discussion

Osteomalacia means softening of bones, is the adult counterpart of rickets. (Maheshwari J, 1998)⁵. The adolescent with osteomalacia presents with non-specific symptoms and early recognition requires a high degree of suspicion in the absence of deformities. According to a study conducted in Departments of Physical Medicine & Rehabilitation and Paediatrics, K.G. Medical University, SGPGI, Lucknow on osteomalacia in adolescent girls in northern India, later published in 2003 by J. Rajeshwari¹ et al.; the adolescent girls are discouraged from outdoor activities (in comparison to boys) so that even non-purdah practicing girls, who would otherwise be able to expose the face, neck, forearm, arms and hands to sunshine suffer from severe vitamin D deficiency rickets / osteomalacia. Moreover authors did not encounter a single male adolescent patient. Further it has been observed that low dietary calcium intake was also a pertinent factor in almost all their cases. Dietary calcium deficiency has been shown to cause secondary vitamin D deficiency⁴. This fact was also seen in another study from China³ wherein authors were of the opinion that low dietary calcium intake of rural persons that kept their serum vitamin D levels low in spite of better sun exposure as compared to urban persons. The lower dietary calcium intake may precipitate clinically significant Hypovitaminosis D in these vulnerable groups, in the presence of marginal sun exposure.

In another study on the varying role of vitamin D deficiency in the etiology of Rickets in young children vs

adolescent, conducted at SGPGI & KGMU, Lucknow, the Balasubramaniam K et al 2003² have observed that in the clinically, biochemically and radiologically proved cases of rickets among children, the majority of the children were having normal 25 Hydroxy vitamin D estimation. Children showed complete healing in 3 months whether they received calcium alone or with vitamin D, thus deficient calcium was universal among children and adolescents with rickets / osteomalacia.

Conclusion

Early recognition of adolescent osteomalacia requires high index of suspicion. We must over-emphasize the benefit of adequate sun exposure and dietary calcium intake to the community in general and to younger generation of females in particular.

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An Unusual case of Scaphoid Fracture with Both Fragments Avascular Necrosis with Delayed Carpal Tunnel Syndrome

Dr M Nallegowda, MBBS, MD, DNB (PMR) MNAMS, Senior Resident

Dr U Singh, MBBS, DPMR, DNB (PMR) Professor and Head

Dr M Khanna, MBBS, Junior Resident

Dr Shivananda* G, MBBS, MD (RD)

Dr SL Yadav, MBBS, MD (PMR)

Departments of Physical Medicine & Rehabilitation and Radiology*,
All India Institute of Medical Sciences, New Delhi

Abstract

A case of carpal tunnel syndrome (CTS) occurring after 22 years of scaphoid fracture is presented. The patient reported two months after the onset of symptoms. The cause of CTS due to fracture of scaphoid was evident after history, physical examination, investigations and excluding other known causes of CTS. Roentogram and MRI findings revealed avascular necrosis of both the proximal and distal poles, which is an unusual finding. The patient experienced improvement in symptoms after conservative treatment and local injection of steroid.

Key words: Scaphoid fracture, Avascular Necrosis, Carpal tunnel syndrome, Rehabilitation

Introduction

Fractures of scaphoid are most common amongst wrist fractures, most prevalent in active energetic adolescents. Scaphoid fractures are produced by wrist hyperextension greater than 90 degree combined with radial deviation. Compression and hyperextension forces have been shown to result in scaphoid waist fractures.¹ These injuries are prone to complications like non-union, malunion and late degenerative changes. The displacement of fracture, avascular necrosis can cause non-union. Symptomatic non-unions have a high probability of degenerative change^{2,3,4} and even asymptomatic non-unions are likely to develop degenerative changes and eventual symptoms.⁵ Avascular necrosis is common in the proximal fragment because of its peculiar vascular supply and distal fragment avascular necrosis is rare and so far not we have not come across any report in the literature.

Carpal tunnel syndrome (CTS) is the commonest entrapment neuropathy. The dorsal subluxation of carpal bones can cause narrowing of the cross-sectional area of the carpal tunnel thus leading to CTS. Median neuropathy can occur immediately at the time of scaphoid

fracture⁶, secondary to fracture reduction technique or late associated with immobilization and as a chronic complication related to malunion of the fracture and compromise of the carpal tunnel.⁷

Few cases of delayed CTS have been reported in literature. In 2003 Goyal et al reported a case of delayed CTS after 22 years due to malunited Colle's fracture.⁸ Only one case of delayed CTS because of old displaced scaphoid fracture has been reported in literature.¹² Here a case is reported which developed CTS after 22 years of scaphoid fracture. Roentograms and CT showed both proximal and distal poles' avascular necrosis which is an unusual finding. As per our knowledge this is the first case to be reported of such type.

Case Report

A 43 years old, non-alcoholic, salesman by occupation presented to our out patients department with the chief complaints of pain, numbness and tingling on the radial side of left hand in the distribution of median nerve for about two months. The symptoms were more at night and in cold weather and exacerbated after driving two-wheeler. After massaging the hand he used to get relief from symptoms. The patient gave a history of trauma 22 years back when the patient fell on both of his hands while playing kabbadi (a type of contact sport). The

Address for Correspondence: Dr M Nallegowda, Departments of Physical Medicine & Rehabilitation, All India Institute of Medical Sciences, New Delhi 110029, email: drmallik@yahoo.com

patient had pain in left wrist; he was then treated conservatively elsewhere by immobilization with plaster of Paris cast, duration of which is not known correctly. The pain subsided in few months time. No radiographs were taken at the time of injury. The patient remained asymptomatic till two months back when the symptoms started developing and gradually increased in severity. The patient denied any significant medical or surgical history. Review of systems was negative for diabetes mellitus, gout, any infection or hypothyroidism; there was no other evident cause for CTS like rheumatoid arthritis, Colle's fracture. Also there was no history suggestive of similar symptoms in the past.

Physical examination revealed mild wasting of left thenar muscles and a palpable soft tissue mass with central bony prominence on the radial side of the dorsal aspect of wrist. No abnormal sweat pattern in median nerve distribution was observed. There was terminal restriction of dorsiflexion at wrist joint due to swelling on the dorsal aspect. Tinel's sign and Phalen's test were positive and there was no sensory deficit. Roentograms revealed non-union of scaphoid fracture with sclerosis of both proximal and distal fracture fragments suggesting avascular necrosis of both fragments (Fig-1). Later Axial NCCT was done which revealed fracture of scaphoid bone with



Fig-1: PA radiograph of left hand showing non-union of scaphoid bone fracture with sclerosis of both the fracture fragments suggesting avascular necrosis of both fragments with collapse of proximal pole.

sclerosis of both the fracture fragments with areas of lucencies inside suggesting post traumatic avascular necrosis of scaphoid (Fig-2). MR image findings suggested fracture scaphoid with displacement of fracture

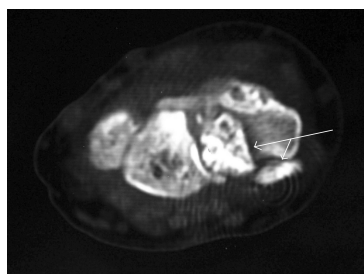


Fig-2: Axial NCCT image of wrist showing fracture of scaphoid bone with sclerosis of both the fracture fragments with areas of lucencies inside suggesting post traumatic avascular necrosis of scaphoid.



Fig-3: Coronal T1 weighted MR image of wrist showing fracture of left scaphoid bone with loss of normal marrow signal intensity in both fragments. In addition foci of low signal intensity areas are also seen in trapezoid and hamate suggesting degenerative changes.

fragment just below the extensor tendons on dorsal aspect of left radius with severe degenerative changes of capitate and hamate bones.

The electrophysiological findings of the patient are shown in Table- 1. With the above findings patient was diagnosed as left delayed CTS due to old scaphoid fracture. The patient refused any surgical intervention; he was



Fig-4: Coronal T1 weighted MR image of wrist showing foci of low signal intensities in capitate bone suggesting degenerative changes.

prescribed NSAIDS (Valdecoxib) and carpal tunnel splint. He was advised to avoid excessive movements at wrist joint and for proper posture of limb like to keep arm elevated during sleep to reduce edema around carpal



Fig-5: Axial T2 weighted MR image of wrist showing displaced fracture fragment of scaphoid on the dorsal aspect beneath the extensor tendons.

tunnel. A local injection of triamcinolone in left carpal tunnel was given. He reported 75% reduction of symptoms after two weeks. The patient did not show any exacerbation of symptoms in the ensuing three months.

Discussion

The exact mechanism by which this patient developed CTS is not clear. We have ruled out all other possible causes for CTS. The likely mechanism for development of CTS may be due to a degenerative change after scaphoid fracture. Generally any physical insult like trauma or fracture can lead to early degenerative changes, which are associated with fibrosis and synovitis⁸, which may lead to compression, ischemia of nerve and pain. Coonay et al found that volar fracture fragments, excessive callus formation and localized swelling were responsible for most cases with CTS in Colle's fracture⁹.

A few cases with the development of CTS after scaphoid fracture has been reported in literature. Olerud et al reported a case of acute CTS, which developed within three hours of fracture scaphoid and fifth metacarpal bone due to compression by a haematoma, which responded dramatically after surgical decompression of the carpal tunnel.⁶ Lee DJ et al reported a case of delayed CTS due to old displaced fracture of scaphoid, the patient got relief after the excision of the displaced fragment.⁷ In 1992 Monsivais et al, reported a case of persistent CTS which did not respond to standard surgical release, later it was found that the median nerve was compressed against the flexed distal pole of scaphoid. The patient was treated with internal fixation of scaphoid.¹⁰

Neurophysiological studies are still one of the most valuable techniques to determine the extent of nerve compression or injury. However, in cases where the nerve conduction studies or symptoms are ambiguous¹¹, ultrasound, CT scan and MRI may help to establish the diagnosis by demonstrating compression of the median nerve. Our patient's MRI, CT and roentograms revealed non-union with avascular necrosis and displacement of both the fracture fragments along with arthritic changes. The avascular necrosis of the distal fragment was not found reported in literature. The significant number of scaphoid fracture complications development can be attributed to its peculiar vascular anatomy, especially of the proximal pole, which is vulnerable to post traumatic ischemia and avascular necrosis because of its precarious blood supply. Gelberman and Menon¹² found that the scaphoid bone receives its vascularization mainly from the radial artery with the dorsal and volar branches entering through the distal portion of the bone. The vasculature enters the dorsal area of the bone through numerous small foramina along the spiral groove and

dorsal ridge. These feeding vessels arise from the dorsal scaphoid branch of the radial artery and the dorsal radial carpal arch. These sources account for approximately 80% of the total blood supply to the scaphoid. The distal area of the bone is supplied with 20% of the total blood supply to the scaphoid by palmar vessels that enter through the tubercle and distal pole. In this patient at the time of trauma there was possibly complete disruption of vascular supply causing avascular necrosis of both proximal and distal poles of scaphoid. Green et al reported that total avascular necrosis was present in only 5-10% of scaphoid fractures and almost certainly in proximal pole fractures.¹³ The development of CTS in this can be due to the avascular necrosis of the both fragments, leading to severe arthritis causing swelling and irritation of the median nerve. The swelling on the dorsal aspect of the wrist was due to displaced bony fragment and secondary osteoarthritis of carpal bones. The swelling partially reduced after the local steroid injection and the symptoms also reduced markedly. The other possible mechanism for development of CTS can be due to the distal fragment avascular necrosis causing compression on the nerve or the carpal tunnel either directly or through the secondary osteoarthritis changes of other carpal bones. We were not able to establish the compression of the tunnel or the nerve through the MRI findings.

Table 1: Electrophysiological parameters of the patient

<i>Motor Nerve</i>	<i>Distal latency (msec)</i>	<i>CMAP amplitude (µV)</i>	<i>Velocity (m/sec)</i>
Median Right	3.30	11.8	88.5
Median Left	5.20	6.7	47.3
Ulnar Right	3.00	2.7	47.4
Ulnar Left	2.95	1.1	46.6
<i>Sensory Nerve</i>	<i>Distal latency (msec)</i>	<i>SNAP amplitude (µV)</i>	<i>Velocity (m/sec)</i>
Median Right	4.50	27.9	41.7
Median Left	6.15	27.9	27.8
Ulnar Right	1.50	34.0	62.0
Ulnar Left	4.45	28.7	33.3

Normal values of our electrophysiology laboratory

Median motor distal latency <3.2msec, median sensory distal latency <3.2msec,

CMAP= compound motor action potential, SNAP= sensory nerve action potential

To conclude a detailed history especially of trauma and radiographic findings help to know the definite etiology and thus accurate management of CTS. Delayed CTS with avascular necrosis of both scaphoid fracture fragments is not documented in the literature. Old fracture

of scaphoid with avascular necrosis of both fragments may be a cause for CTS and should be considered in cases presenting as late CTS.

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Polyarthritis in a HIV Positive Patient

Dr. Ak. Joy Singh, MBBS, MD, DNB, DSM, DHA, DIPR, Associate Professor(PMR)

Dr. N. Bimol Singh, MBBS, Registrar (PMR)

Dr. N. Biplab, MD (MU), Assistant Professor (Medicine)

Dr. W. Jatiswar Singh, MD, Associate Professor (Radiodiagnosis)

Regional Institute of Medical Sciences, Imphal-795008

Abstract

Association between Human Immunodeficiency Virus infection and polyarthritis is less understood in our present set up. A 28 years old male presented with polyarthritis for a period of 6 months and history of weight loss and frequent attacks of loose motion for a period of 3 months. Inflammatory markers and immunological investigations for arthritis were not supportive. ELISA test for retrovirus antibody was found positive and confirmed by Western Blot test. Ultimately, a diagnosis of HIV associated Arthritis was made. Patient improved with local methylprednisolone injections and immunomodulatory therapy.

Key words: Polyarthritis, Human Immunodeficiency Virus infection.

Introduction

Polyarthritis is a common clinical presentation among patients in our day-to-day physiatry practice. When common inflammatory markers and immunological investigations do not support the clinical presentations, we started looking for a non-rheumatoid cause of arthritis. Within the last decade, human immunodeficiency virus (HIV) associated arthritis has been studied by many authors. We also came across a patient presenting as polyarthritis associated with HIV infection. This case is reported for the benefit of physicians dealing with arthritis to keep this possibility while dealing with arthritis.

Case Report

A 28 years old male, businessman in desktop related works, married for about 2 years with a 6 month old daughter reported to the Department of Physical Medicine and Rehabilitation OPD with the complaints of multiple joint pain, evening raise of temperature not responding to treatment for about 6 months. He was unable to walk independently without support due to pain and swelling of the left ankle joint and could not work with computer due to swelling of wrist and elbow joints on the left side with flexion deformity of 30° in elbow. He gave history of loss of weight and 3-4 attacks of diarrhoea treated with intra venous infusions during the last 3 months. There was no family history suggestive of arthritis. There was no history for blood transfusion, tuberculosis, diabetes, etc.

Examination revealed swelling in the left wrist and elbow joints, left ankle and raise of local temperature in the joints including knee and right wrist. 30° Flexion deformity of the left elbow and synovitis of tibialis posterior tendon on the left side were also noted. Neurological examination did not reveal any deficit except for wasting without weakness of the thenar eminence, 1st web and forearm of the left upper limb.

He gave history of contact with local sex workers without protection on 2-3 occasions when he was undergoing computer engineering course.

Haemogram showed TLC (8000/mm³), N (76%), L(22%), ESR(02mm/1st hr, 05/2nd hr), negative CRP(tested twice), Rheumatoid factor, and equivocal report(55 U/ml) of anti-ds DNA antibody. Renal and liver functions tests, blood sugar were essentially normal. Nerve conduction velocities (NCV) for both motor and sensory nerves in the upper limbs were within normal limits. MRI of the cervical spine did not reveal any bony or spinal cord pathology.

Based on the history, clinical and investigation findings, possibility of a non- rheumatoid cause of polyarthritis was considered and ELISA test for retrovirus antibody was done after counselling the patient. It was communicated as strong positive. As per protocol of National AIDS Control Organization (NACO), the test was repeated two more times and further confirmed by Western blot test. CD4 count was 314/mm³. Anti retroviral therapy was not considered as per the institutional policy since CD4 count was above 300. Both his wife and daughter tested negative for retrovirus.

Address for Correspondence : Dr Ak. Joy Singh, Associate Professor, Department of PMR, Regional Institute of Medical Sciences, Imphal-795008 E mail- joyakojam2@yahoo.com

He was treated with intra-articular injections of methyl prednisolone in the left elbow and wrist joints followed by local infiltration of hydrocortisone in the synovium of the tibialis posterior near the left ankle. An oral antibiotic (doxycycline) was given for one month and simultaneously oral methotrexate (7.5 mg weekly) and folic acid were also instituted. Potential side effects of methotrexate were kept in mind while giving methotrexate in HIV infected patients. Liver function test, TLC, DLC and platelets were checked regularly. CD4 count checked after 3 months of initiation of therapy was 302/mm³. He was symptom free during the last check up in April 2005. This case report was submitted after taking a written consent from the patient. This report highlights a wide horizon of polyarthritis and to consider HIV associated arthritis as another cause of polyarthritis.

Discussion

Since the beginning of the human immunodeficiency virus (HIV) epidemic, several musculoskeletal manifestations had been reported in infected individuals¹. Many of these were described in small groups of patients. HIV associated arthritis, infectious arthritis, and spondyloarthropathies are the best characterised manifestations of human immunodeficiency virus². The number of CD4+T cells as a predisposing factor for the different musculoskeletal manifestations has not been fully elucidated³.

The exact incidence of manifestation of arthritis in patients with HIV remains unclear. The classical presentation is that of reactive arthritis related directly or not to the viral infection⁴. The pattern of articular involvement seen early in this HIV infected patients is quite similar to that seen during other viral disorders, including acute onset, self limited course, polyarticular involvement, and lack of radiological damage. As observed by others, it is of interest that these signs resolved when antiviral therapy was started⁵. This presentation is very different from the common reactive arthritis following gut or respiratory infection⁶. The immunodeficiency state related to HIV may favour infections and increased severity has been observed in combination with HIV^{4,7}.

There have been controversies regarding co-incidence of HIV and typical Rheumatoid Arthritis (RA). However, there is a classical relative exclusion between these 2 diseases⁸. Regression of RA has been in some but not all patients with RA who became HIV seropositive⁹. However, RA-like manifestations has been observed in HIV patients, particularly in Africa¹⁰. Indeed, patients with RA combined with HIV tend to have a milder arthritis, and rheumatoid factors and antinuclear antibody are seldom found⁴.

The use of active drugs for RA in the context of HIV remains problematic. Methotrexate was rapidly active in this patient. Its effect on HIV patient is unclear, but it may worsen the disease. This issue will be even more difficult to address when the current new treatments including cytokine inhibitors are discussed in the context of concurrent HIV infection. When anti-TNF- α treatment, namely etanercept was given to an HIV patient with psoriatic arthritis, severe infection was observed¹¹. Accordingly, careful follow up and additional cases are needed to clarify this issue.

Bileckot¹² reported 32 cases of HIV related arthritis. Acute, febrile, asymmetrical, nondeforming, nonerosive polyarthritis was the most common clinical pattern of arthritis in HIV-positive patients. Rheumatologists need to know how to provide counselling.

Berman et al⁴ studied 270 patients with HIV infection for the presence of rheumatic complaints. He reported 7.8% (n=21) patients presented with HIV associated arthritis after excluding HLA - B27 related arthritides such as Reiter's syndrome, psoriatic arthritis and rheumatoid arthritis. Males were more involved than females (27:4) with a mean age of 34.8 + 11.1 years. Presentations were oligoarticular in 10 (47%), monoarticular in 8 (38%), asymmetrical in 2 (9%) and symmetrical in 1 (4%). The mean duration for arthritis was 2 weeks (1-24 weeks). Rheumatoid factor and HLA-B27 antigen were negative in all 15 patients where above investigations were performed. He did not find strong correlation between duration of arthritis with the HIV stages and type of articular involvement; however, he noticed a trend between the number of involved joints and stages of HIV infection.

Three patients with rheumatoid arthritis that remitted with the development of the HIV infection has been described in the literature, and this has contributed to the belief that RA and HIV infection or the acquired immuno deficiency syndrome(AIDS) cannot coexist. It appears that active RA may indeed coexist with AIDS. It remains to be seen under what setting HIV may have a disease modifying effect in RA. These issues have important implications regarding the pathogenesis and therapy of RA, especially in terms of the role of CD4+ lymphocytes and anti-CD4 monoclonal antibody therapy.

Javier Marquez et al¹³ studied frequency and characteristic of HIV virus associated arthritis in patients receiving highly active antiretroviral therapy(HAART). He reported 75 individuals with HIV infection and musculoskeletal manifestations which include 65 men and 10 women with a mean age of 32 + 4.5 years (range 21 – 58). Mean CD4 cell count was 250/mm³ (range 20-450), and mean HIV viral load was 5210 (range 0-75300) copies/ml.

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Cox-2 Inhibitors - Recent Controversies

Non-steroidal anti-inflammatory drugs (NSAIDs) are one of the most commonly prescribed group of drugs worldwide. These drugs are prescribed for patients suffering from OA, RA, soft tissue injuries, traumatic arthritis and other inflammatory disorders, dysmenorrhea, post traumatic pain etc. Furthermore, NSAIDs are also marketed as over the counter (OTC) drugs which increase the number of uses, selective Cox-2 inhibitors (Celecoxib, Rofecoxib, Valdecoxib) were developed with the aim of producing lesser gastrointestinal adverse effects. Initial clinical studies showed that Cox-2 inhibitor rofecoxib resulted in significantly fewer clinically important upper gastrointestinal (GI) events than naproxen.

Similarly celecoxib in clinical study when used for six months in a dosage 2 to 4 times the maximum therapeutic dosage was associated with a lower incidence of combined clinical upper GI adverse effects than ibuprofen and diclofenac.

But there was abrupt withdrawal of rofecoxib on September 30, 2004 alongwith safety concern related to use of Cox-2 inhibitors. The withdrawal of rofecoxib (Vioxx) was because of an interim analysis of a prospective randomized, placebo controlled double blind Trial (APPROVE). In summary, the three years data from this trial showed that after 18 months of drug therapy, patients receiving rofecoxib had almost twice the risk of Cardiovascular events compared to those taking placebo. The rate of myocardial infarction and stroke was 3.5%

in the rofecoxib group versus 1.9% in the placebo group.

Also clinical concern emerged with the report of VIGOR trial in November 2000. This study compared the occurrence of clinically important upper gastrointestinal events with rofecoxib 50 mg/day or naproxen 1000 mg/day in 8076 patients with RA. These patients were given drug therapy for a mean period of nine months. The results of VIGOR trial indicated the gastrointestinal safety of rofecoxib, also it showed relative risk of developing either a serious thrombotic cardiovascular adverse event or a MI with rofecoxib compared with napeoxen.

Furthermore in addition to safety concern about Cardiovascular safety of Valdecoxib, there are adverse effect reports of serious skin reactions (Toxic epidermal necrolysis) sometimes with fatal outcome. Both rofecoxib and Valdecoxib have been banned in India.

To conclude, the Coxib saga is an important reminder to clinicians that adverse effect profile of a new drug cannot be completely known when it is introduced in practice. Therefore, a new drug should be given with caution to lesser number of patients in early years after its release.

– **Dr Kamal Kishore**
Professor

Department of Pharmacology
AIIMS, New Delhi 110029

Cox-2 inhibitors - Controversy over Controversy

As if the above was not enough. I felt, I must add to the confusion in an effort to achieve clarity on the subject. As a clinician getting feedback from the patients on whom we can sufficiently rely on, specially those who have used these drugs for a long period of time prescribed or not prescribed, the choice of the analgesic and anti-inflammatory drug if left with the patient, the patients would prefer to take the drug which is effective in giving them relief for a sufficient period, does not require frequent dosage, is gastro-friendly and apparently does not harm them. To most patients, Cox-2 inhibitor drugs were a boon. Considering the prescription of NSAIDs, Analgesics and Cox-2 inhibitors, the quantum amounted to over 10,000 prescriptions in one year in my out-patients, of which about two thirds were of Cox-2 inhibitors until the time preceding the ban on Rofecoxib about an year ago and on Valdecoxib about six months ago in India. Specifically getting the history of uncontrolled hypertension was amongst the contra-indications of using the Cox-2 inhibitors though with Valdecoxib as per the drug safety profile the risk predicted was relatively lesser than Rofecoxib, hence Valdecoxib was prescribed more freely than Rofecoxib. The efficacy of Rofecoxib as well as Valdecoxib in the control of pain reported by the patients was very good. Even patients having acute inflammation because of arthritic conditions or trauma reported appreciable relief of pain lasting more than 24 hours with a single dose of Rofecoxib 25 mg or Valdecoxib 20 mg. With controlled hypertension the drug was used with caution and the patient was asked to have frequent recording of the blood pressure. A few (less than 10) reported a little upward variation of the blood pressure where they were asked to stop the drug. To say that these occurred specifically with Cox-2 inhibitors would be wrong to say, the challenge to the blood pressure, kidneys or a mere edema in the legs or generalized including the face was a feature more or less equally observed amongst various NSAIDs and Cox-2 inhibitors, though not that a frequent occurrence altogether, under 20 patients in a year with no major catastrophe. As per the gastric safety of the Cox-2 inhibitors was concerned about six patients on Valdecoxib reported frank gastric upset relieved after stoppage of the drug. Three patients on Valdecoxib reported maculo-papular rashes, relieved after stopping the drug and treated with Cetirizine. The behaviour of the patients who were on Rofecoxib and Valdecoxib after non-availability of these drugs in the market has been typical. Those on Rofecoxib easily accepted Valdecoxib after the ban on the former, but those on Valdecoxib were not satisfied to take any other drug even though some other medication was prescribed. The patients reportedly coaxed the chemists and druggists

to obtain drugs lying with them or even consumed expired medicines saying that those gave good relief with lesser side effects, even though told about the ban and potential dangers of consuming the banned medicines.

The questions that are raised are many. First of all, the above comments are based solely on the personal experience without any statistical analysis and are only rough estimates. These would not stand before any scientific scrutiny in the present format. These have been taken preliminarily from part of the project being run in our department to find out the adverse effects of NSAIDs being used in the PMR setting. A more organized analysis from a larger patient database will be available in future. A recent report on the selective cox-2 inhibitors [Coporali R. Montecucco C., Cardiovascular effects of coxibs, *Lupus*. 2005; 14 (9): 785-8] quotes "based on the recent withdrawal of rofecoxib that some concerns arose even for a possible cardiotoxicity of non-selective non-steroidal anti-inflammatory drugs." It further adds "from the data available so far, it seems that coxibs still remain a rational choice for patients with low cardiovascular risk and high gastrointestinal risk. Long term studies with a cardiovascular endpoint involving both selective and non-selective anti-inflammatory drugs are warranted." In the US the drugs were not banned but only withdrawn by the manufacturer from the market with a warning. In India, they were not banned initially but with a lot of pressure from whatever sources, they were banned rather than just a similar warning issued. Maybe we can compare that the literacy rate of India with that of the US and say that people in India may not be that well informed about the side-effect profile hence would not care to take a drug with caution. With no offence meant to anyone, but the question is wherefrom those well informed people came to create a lot of hue and cry about Rofecoxib and Valdecoxib. Where were they when Analgin was marketed in India for ages when it was actually banned in the developed world. What about Piroxicam that was introduced in the market after earning such a bad name in the USA. No one has pushed the government to ban those drugs which carry equally heavy warning about their cardio-vascular and renal safety. Why are we selective to pin-point the selective cyclooxygenase-2 inhibitors. I do not think I can answer the question but only conclude with a controversial remark, as far as India is concerned that their ban was unwarranted. Perhaps we could have left it as our American friends did. Do we always follow the western world? Perhaps no, not in this case, or should we, at least in this case.

– Dr U Singh
Editor