Original Article

Study of Factors Affecting Progress of Locomotor Disability in a Slum in Mumbai

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Abstract

Locomotor disability is one of the most commonly prevailing type of disability in India. This study was conducted with the aim of assessing the severity and to study the factors affecting progress of locomotor disability.

A community based cross-sectional observation study was conducted in an urban slum of Mumbai. Total sample of 3665 individuals were screened; 205 were identified with locomotor disabilities who were subjected to a structured questionnaire and physical examination.

The prevalence of locomotor disabilities is found to be 5.59 %. Females are affected more than the males and unemployment was observed to be very high. Awareness about rehabilitative services was found to be very low and very few individuals had ever taken any treatment. Majority of the individuals detected with locomotor disability were ambulatory, showed good IADL score and muscle power as well as single joint involvement. Advancing age and longer duration of disability have been associated with low scores of IADL, low muscular power, multiple joint involvement and increased duration of disability. Treatment started at young age, on immediate diagnosis will halt the progress of the disease. Availability and awareness of rehabilitation facilities will go a long way in improving the quality of life of individuals with locomotor disabilities.

Key words : **Locomotor disability, IADL score, muscle power, number of joints, duration of disability.**

Introduction:

Musculoskeletal conditions are frequently cited as among the most common and disabling of the chronic diseases. Unlike other medical conditions, such as cardiovascular disease and cancer, musculoskeletal conditions are rarely the cause of death. Instead, musculoskeletal diseases are noted for causing deterioration in the quality of life. These conditions affect the quality of life through increased disability, limited activity, physical pain, and impairment.These disorders also result in serious economic consequences for society.[1] Census 2001 has revealed that over 21 million people in India are suffering from one or the other kind of disability. This is equivalent to 2.1% of the population. Among the five types of disabilities 27.9% were observed having disability in movement.[2] The NASSO study[3] showed that, among the different types of disabilities, the prevalence of locomotor disability was highest in the country–it was 1046 in the rural and 901 in the urban per 100000 persons. Current demographic trends show that the number of older people is rapidly increasing. Accordingly, the prevalence ofdisability in basic, self-care activities of daily living is also rising, posing a great challenge to the health care and social systems that are already experiencing financial constraints.[4,5] In this scenario we need to absorb people with disability in the mainstream socially as well

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as financially.To make the disabled people self sufficient and improve their quality of life, we need to understand factors which affect the progress of their disease. With this aim in mind, this study was conducted among people detected with locomotor disability, to assess the severity of their disability and to study the factors affecting progress of disability in them in a slum area of Mumbai.

Materials and Methods:

The study was carried out in an urban slum which is the field practice area of a teaching hospital in Mumbai. The study is cross-sectional and observation based. A pilot study was conducted which showed a prevalence of 10% of locomotor disability among the screened population. Based on this minimum sample of 3600 was estimated. A household was taken as a single unit by stratified systematic random sampling in two demarcated areas of the slum. All members of the household were included in the study. A sample of 3665 individuals was taken. The interns posted in the department of community medicine were involved in data collection. They were trained in identification of disabled individuals as per the NSSO criteria[3], administration of the questionnaire, measurement of IADL score and gradation of muscle power by the authors. The medical social workers and Health Assistants guided the interns in the community.

Criteria used in 58th Round National Sample Survey Organisation (NSSO) was used to identify individuals with locomotor disability. Persons having locomotor disability included in the study were those with (a) loss or absence or inactivity of whole or part of hand or leg or both due to amputation, paralysis, deformity or dysfunction of joints which affected his/her "normal ability to move self or objects" and (b) those with physical deformities in the body (other than limbs), such as, hunch back, deformed spine, etc. Dwarfs and persons with stiff neck of permanent nature who generally did not have difficulty in the normal movement of body and limbs was also treated as disabled.[3]

Those identified with locomotor disability, were subjected to the questionnaire and Index of Activity of Daily Living score (IADL) to assess the ability to perform day to day activities. The IADL is a scale whose grades reflect profiles of behavioural levels of six sociobiological functions, namely, bathing, dressing, toileting, transfer, continence, and feeding. The IADL score is as follows [6]:

Activity		Score
A	totally independent	6
B	totally independent except for one	5
C	dependent in bathing + another	4
D	dependent in bathing + dressing up + another	3
E	dependent in bathing + dressing up + toileting + another	2
F	dependent in bathing + dressing up + toileting + transferring + another	1
G	totally dependent	0
H	dependent in at least two activities, but not classified as C, D, E or F	4

Its hierarchical nature makes it possible to rank the overall functional status of people in an ordered manner. The index has been used to produce predictive information about chronic conditions and to evaluate the benefits of long-term services. It has been used in profiled measures of severity of illness.[7]

Muscle power was graded by applying external resistance to movements of various parts of the body. For upper limb arm, forearm and hand were considered and for lower limb thigh, leg and foot of both sides were considered. Scale used for measuring muscle power 0 to 5:[8]

Grades (Range)	Muscular Activity
0	No contraction
1	Flicker on contraction (very weak contraction)
2	Contraction when gravity is eliminated
3	Visible contraction against gravity but absent after applying resistance
4	Visible contraction against gravity and added resistance
5	Visible contraction against gravity and maximum resistance

Total maximum score is 12 × 5 = 60. Cumulative muscle power ie, percentage of total maximum score was also calculated.

The data collection was done over a period of 3 months. The data was analysed using SPSS software (version 17). 95% confidence limits for prevalence was calculated to estimate the prevalence in the general population,

Chi-square test was applied to identify the association between two variables. Age, duration of disability and sex were predictor variables and IADL score, cumulative muscle power were response variables.

Table 1: ***Distribution of Individuals Affected with Locomotor Disability (n=205)***

Variables	No. of Cases (%)
Age (years)	
<45 years	134 (65.4)
>45 years	71 (34.6)
Sex	
Males	59 (28.8)
Females	146 (71.2)
Employment status	
Unemployed	154 (75.1)
Employed/Self employed	51 (24.9)
Per capita income (Rs)	
<500	128 (62.5)
>500	77 (37.5)
Duration of disability	
<1 year	55 (26.8)
1-5 Years	97 (47.3)
>5 years	53 (25.9)
Ambulatory status	
Walk without support	197 (96.1)
Walk with support	7 (3.4)
Bedridden	1 (0.5)
IADL score	
A	192 (93.7)
B	10 (4.8)
C	2 (1)
D	0
E	0
F	0
G	1 (0.5)
H	0
Muscle power (%)	
100 (Normal)	64 (31.2)
96-99	70 (34.1)
81-95	34 (16.6)
< = 80	37 (18.1)
No. of joints involved	
Nil	2 (1)
1	118 (57.5)
>1	85(41.5)
Awareness of rehabilitation services in vicinity	
Yes	42 (20.5)
No	163 (79.5)
Treatment taken for present condition	
Yes	73 (35.6)
No	132 (64.4)

Results:

Total sample of 3665 individuals were screened for locomotor disabilities. Among 3665 individuals 205 were identified with locomotor disabilities. Thus, the prevalence of locomotor disabilities is 5.59% (95% C.L. 4.85% to 6.33%). The study was further carried out on these 205 disabled individuals. Mean age of the affected sample was 38.89 years with standard deviation 15.1 years. Out of the total sample, 49.3% were illiterate and 69.3% were married.

As observed in Table 1, 65.4% of affected individuals were less than 45 years of age; 71.2% of the total sample were females, 75.1% were unemployed with 62.5% having families with per capita income less than Rs 500. Majority of the sample (74.1%) had duration of disability of less than 5 years. Only 25.9% were suffering from disability for more than 5 years; 96.1% of the individuals with disability could walk without support, 93.7% of affected individuals had IADL score A which indicates that they are totally independent; 81.9% had more than 80% muscle power retained in extremities; 31.2% had normal muscle power in all limbs; 57.5% affected individuals had single joint involvement. 79.5% of the sample were not aware of any rehabilitative services in the area of their residence. Only 35.6% of their population had ever received treatment for their locomotor disability.

Table 2 shows association of various factors affecting progress of locomotor disability. It is observed that disabled individuals more than 45 years of age and those having disability for more than 5 years, had significantly low score of IADL ($p<0.005$ and $p<0.001$respectively). This indicates that advancing age and longer duration of disability are associated with low IADL scores indicating poor daily activities in disabled persons.Advancing age as well as longer duration of disability is observed to be significantly associated with ($p<0.001$for both) low muscular power.More number of disabled persons in higher age group was observed to have involvement of multiple joints ($p<0.001$). More number of females was seen to have multiple joint involvements than males ($p< 0.05$). Individuals with age more than 45 years showed more than 5 years of duration of disability.This association was statistically significant ($p<0.01$).

Discussion:

The prevalence of locomotor disabilities in the current study is 5.59%. Census of India 2001, estimated 28% of

Table 2: ***Association of various factors affecting progress of locomotor disability***

Variables		No. of cases (%)			
IADL score	**A**	**B-G**		**Total**	**Test of significance**
Age (years)					
<45	117 (98.3)	2 (1.7)		119 (100)	X^2=8.61
>=45	75 (87.2)	11 (12.8)		86 (100)	DF=1 P<0.005
Duration of disability					
<=5 years	148 (97.4)	4 (2.6)		152 (100)	X^2 =11.06
>5 years	44 (83)	9 (17)		53 (100)	DF=1 P<0.001
Muscle power	**<= 80**	**81-95**	**>95**	**Total**	**Test of significance**
Age (years)					
<45	7 (5.2)	14 (10.5)	113 (84.3)	134 (100)	X^2 =65.32
>=45	30 (42.3)	20 (28.2)	21 (29.5)	71 (100)	DF=2 P<0.001
Duration of disability					
<=5 years	17 (11.2)	26 (17.1)	109 (71.7)	152 (100)	X^2 =19.05
>5 years	20 (37.7)	8 (15.1)	25 (47.2)	53 (100)	DF=2 P<0.001
No of joints involved	**<=2**	**>2**		**Total**	**Test of significance**
Age (years)					
<45	101 (84.9)	18 (15.1)		119 (100)	X^2 =12
>=45	55 (64)	31 (36)		86 (100)	DF=1 P<0.001
Sex					
Male	51 (86.4)	8 (13.6)		59 (100)	X^2 =4.87
Female	105 (71.9)	41 (28.1)		146 (100)	DF=1 P<0.05
Duration of disability	**<1 yr**	**1-5 years**	**>5 years**	**Total**	**Test of significance**
Age (years)					
<45	34 (28.6)	64 (53.8)	21 (17.6)	119 (100)	X^2 = 10.21
>=45	21 (24.4)	33 (38.4)	32 (37.2)	86 (100)	DF=2 P<0.01

total disabled population with movement disabled where as NSS (National Sample Survey, 58th round, 2002) estimates them at 51%.[5] Study conducted by Borker S. etal[9] in rural Goa found a prevalence of 0.9%. Out of the total sample, 49.3% were illiterate and 69.3% were married; 65.4% of the study population were less than 45 years of age. Similar findings were observed in some other research studies.[10,11] Most (71.2%) of individuals with locomotor disability were females. Similar findings have been observed in Census 2001, where Tamil Nadu was observed to have a higher number of disabled females than males.[2] However study conducted by Patel observed that males were more susceptible for developing disability than females.[11]

The present study shows very high rate of unemployment (75.1%) as well as most of the families having per capita income less than Rs 500 (62.5%). Based on National Sample Survey data, Mitra and Sambamoorthi[12] showed that the employment rate of persons with disabilities is only 60% that of the all India working age population.[12] Murt, *et al*[1]. conducted a study on disability, utilisation, and costs associated with musculoskeletal conditions in United States, in which it was observed that, musculoskeletal problems accounted for a total of $3.9 billion in lost productivity costs during 1980 for employed persons in the work force and for homemakers and thus posed significant economic burden.

About 3/4 the ie 74.1% of population were suffering from disability for less than 5 years. This indicates that most of the cases were of recent origin. There are chances that such cases will be more receptive to rehabilitative services and thus progress of the disability can be halted in them by timely interventions.

Another positive observation in the current study is that majority of the population is ambulatory and showed good level of IADL score. Similar findings were observed in multiple other studies. In NSS round 58, it was observed that, about 60 per cent of the disabled were able to take self-care without any aid or appliances.[3] The WHO-ILAR Community Oriented Program for Control of Rheumatic Diseases (COPCORD) states that although

rheumatic-musculoskeletal symptoms/disorders is a predominant ailment, it has a modest effect on daily living in most subjects suffering from it.[13] Milla´n-Calenti *et al*[6]. conducted a study using the IADL score. It was observed that, in relation to the categorization of subjects according to the ADLscore 34.6% of the total subjects studied presented some kind of dependence on the ADL scale; within them, 1.7% presented dependence for all ADL and 21.9% for at least one (category B).[6]

A sizeable section of the individuals with ie 31.2% locomotor disability had normal muscle power and 81.9% had power more than 80; 57.5% showed single joint involvement and 41.5% had more than 1 joint affected. Peat *et al*[14]. observed that, a total of 1226 (50%) had more than one joint involved. The current study show that only 20.5% of the affected individuals were aware of rehabilitative services in the nearby area and only 35.6% individuals had received any treatment for their disability. Swaddiwudhipong *et al*[15]. observed that there are many persons with untreated disabling conditions in rural communities, and that a significant number of them can benefit from medical treatment and rehabilitation. Chopra *et al*[13]. observed that, 21% of patients had never visited a doctor and were only identified by the COPCORD study. In the report on disability, Walia[5] mentions that although the overall burden of diseases was 20.9% in India the proportion of health expenditure was less 1% . Thus, there is a need of systematic and organised community based rehabilitation facilities to identify and take care of persons with disability wherein they can be managed and treated.[5]

As observed in Table 2, individuals above 45 years of age had significantly low IADL scores.In a systematic review conducted by Rodrigues *et al* [16]. it was observed that increasing age was the most frequent risk factor for functional disability. The Rotterdam Study [17], stated that disability in the activities of daily living is a major problem in people aged 55 years and over. Milla´ n-Calenti *et al*[6]. observed that there is a negative correlation between age and the score obtained with the IADL scale ($r = -0.527$; $p < 0.001$) which is indicative of the association between age and the low IADL scores which would imply the tendency towards dependence; i.e., the older, the more dependent in IADL.

Advancing age has also found to be associated with low muscle power in the current study. Similary Runge *et al*[4] observed that all parameters of muscle performance were negatively correlated with age.

Puthoff and Nielsen [18] stated that all measures of strength and power were indirectly related to the LLFD I disability component and suggested that older adults should focus on increasing and maintaining lower extremity strength and power across a range of intensities in order to decrease functional limitations and disability. Age more than 45 years was also found to be associated with multiple joint involvement and longer duration of disability. Similarly, in the Rotterdam study[17] it was observed that, the prevalence of locomotor disability increased linearly with the number of joint sites that were painful.[17]

The current study states that as duration of disability increases IADL score as well as the muscle power significantly decrease. Conversely individuals with recently diagnosed disability showed significantly higher IADL scores as well as muscle power. Thus management of disability as soon as diagnosed will reflect positively on the progress of the disease. Similarly Ormel *et al*[19]. concluded that to improve quality of life in elderly adults, treatment should target disability when it is new.

Females have found to be significantly associated with multiple joints involvement in the current study. Similarly, the study conducted by Peat G *et al*[14]. it was observed that, multiple joint pain and pain across more than one region were more common in women than in men.

Conclusion:

The study shows that locomotor disability in the community is not of severe nature as majority of the individuals detected with locomotor disability were ambulatory, showed good IADL score and muscle power as well as single joint involvement. Advancing age and longer duration of disability have been associated with low scores of IADL, low muscular power, multiple joint involvement and increased duration of disability. Thus advancing age and longer duration of disability will make rehabilitation difficult. However, the positive finding is that majority of affected individuals in the study are less than 45 years of age and with disability of less than 5 years. Thus if rehabilitative services are targeted to these groups, their deterioration can be effectively prevented by early diagnosis and prompt treatment. Females were found to be affected more than males. They should be specially targeted through existing programmes for women. Lastly, rehabilitative services need to be developed at grassroot level and awareness needs to be created regarding their availability. This will increase the number of people seeking treatment, limit the disability, and will eventually improve

the employment rate and financial status of people with locomotor disability. Thus timely diagnosis and effective rehabilitation services will go a long way to restrict the deterioration of individuals with locomotor disability.

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