

## **Acceptability of Conventional Lower limb Orthoses in the Rural Areas**

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### **Abstract :**

A study to find out level of rejection, reasons for rejection and association between rejection and various parameters was conducted on 100 loco-motor handicapped patients belonging to rural areas in Manipur, fitted with Conventional lower limb orthoses in the year 1993 from the Department of Physical Medicine and Rehabilitation, Regional Institute of Medical Sciences, Imphal. Rejection in the hilly areas was 82.75% in comparison to 49.29% in the plain areas. Rejection was slightly higher in females (64.86%) in comparison to 55.55% among males. Rejection was lowest among graduates (28.57%) and highest in no-formal education group (80%) and labourers (100%). Bilateral and unilateral lower limb involved cases were comparable in number (51% versus 49%). Rejection was around 59% in both. 56% of patients were fitted with KAFO's, 29% with AFO's and 15% with HKAFO's. Rejection was highest among patients using AFO's (86.20%). 100% rejection was observed among patients using Bilateral HKAFO's. Architectural barriers such as threshold in doorways, step/staircase, high floor level housing, uneven roads, hilly terrain were observed. Negative social attitudes also contributed in rejection in 76%. Lack of significant improvement with orthoses was the commonest reason for rejection. Other common reasons were architectural barriers, ability to ambulate without orthoses, heaviness, and poor cosmesis. Financial problems, poor social acceptance, restriction in activities of daily living and in social and religious places, and dependence to others for donning and doffing, etc. were other contributory reasons. Sex, age, occupation, type of affliction, extent of involvement had no statistically significant association with rejection.

**Key words :** acceptability, rejection, orthoses, rural areas.

### **Introduction :**

There has been increasing awareness of the need of audit in medical practices. One specific area, which has received scant attention, is that of orthoses. Most of the conventional lower limb orthoses designed and developed on western

standards overlook innate problems of the rural areas in India where the floor is used for various activities like sitting, sleeping, eating, working, worshipping, toileting, etc. Squatting and cross leg sitting has been a tradition. Due to warm climate closed shoes are uncomfortable. Most people walk barefoot or in open well-ventilated footwear, often on a rough terrain of the countryside where suppleness of foot is a vital attribute in adapting to uneven surfaces<sup>1</sup>. Again, insurmountable barriers

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in the form of steps, staircase, and thresholds on doors make mobility of locomotor disabled more restricted<sup>2</sup>. Over and above this, few reports available in the literature indicate that there is a large dissatisfaction or low acceptability rate of the lower limb orthoses even in the western set up<sup>3-5</sup>. Common reasons for dissatisfaction were that they were heavy, cumbersome, and cosmetically unacceptable. Therefore, most of the patients prefer to limp around without orthoses for obvious reasons<sup>1</sup>. This amounts to considerable financial loss.

As such no definite planning for community rehabilitation can be done without a thorough understanding of the actual need. There has been very little research data on patient's satisfaction with lower limb orthoses especially in the rural areas of this country. Therefore, in view of the lack of this vital information, a study to find out rejection level of patients with lower limb orthoses especially in the rural set up of Manipur was conducted.

## **Materials and Methods :**

One hundred patients who had been fitted with different lower limb orthoses in the year 1993 at the Department of Physical Medicine and Rehabilitation, Regional Institute of Medical Sciences, Imphal, and using the same for at least one year were studied.

Acceptability/rejection of the conventional lower limb orthoses were studied in relation with various variables such as location, age, sex, level of education, occupation, types of affliction, extent of involvement, types of orthoses, architectural barriers, understanding about the orthoses, etc. Patients' age group below 5 years, patients with associated systemic diseases and those from outside the state were excluded from this study.

Data were collected through a personal questionnaire during home visits. Attempts were also made to interview patients in presence of other

family members and neighbours. Orthoses and architectural barriers were examined during the home visits.

Collected data were entered using Dbase program. Cross checking of the data for any inconsistency was done before the data was put to the statistical analysis. Association of the rejection and different parameters were done by using chi-square test.

## **Results :**

Out of 100 patients studied, 41 patients were found using the orthoses and other 59 were not using the orthoses after one year of fitment. 71 patients belonged to the plain and remaining 29 to the hilly areas. Rejection in the hilly area was 82.75% against 49.29% in the plain area ( $p < 0.01$ ).

Rejection among females ( $n=37$ ) was 64.86% ( $n=24$ ) and among males ( $n=63$ ) was 55.55% ( $n=35$ ) ( $p=0.495$ ). 30% of patients belong to age group of 11 -20 years, 28% in the age group below 10 years, and 9% above 51 years of age. Rejection rate was highest (77.77%;  $n=7$ ) in the age group 31-40 years ( $n=29$ ) and also above 51 years of age group. Rejection in the age group below 10 years was 64.28% ( $n=18$ ). However association between rejection and age was not significant.

Twenty eight percent of patients studied up to middle level, followed by 23% up to high school level, 14% up to primary level, 2% professionals and remaining 26% had no-formal education. Rejection was highest in the no-formal education group (80%;  $n=21$ ) followed by primary level of education (64.28%;  $n=3$ ), and lowest among graduates (28.57%;  $n=2$ ) ( $p < 0.05$ ). 68% of patients were students; others as housewives (9%), businessmen (8%), government service (6%), cultivator (3%), labourers 2% and independent profession 2% and nonoccupied (1%). Rejection was highest among labourers and cultivators (100%) followed by government services (83.33%;

n=5), housewives (77.77%; n=7) and students (57.35%; n=39). Association between rejection and occupation was not significant.

Thirtyseven percent patients had poliomyelitis followed by paraplegia (19%), trauma (9%), cerebral palsy 8% and arthritis (8%), hemiplegia (5%), congenital deformity (3%), 1% each for leprosy, nerve injury, and neuropathy. 80% rejection was observed in hemiplegia, 77.77% in trauma, 75% in arthritis, 52.63% in paraplegia, 50% in cerebral palsy and 45.94% in poliomyelitis ( $p = 0.36$ ). 51% of patients had bilateral involvement. Rejection among bilateral groups was 58.82% and among unilateral lower limb involved patients 59.18% ( $p = 0.87$ ). 56% Of the patients were fitted with KAFOs including 28 bilaterals, 29% with AFOs including 9 bilaterals and 15% HKAFOs including 6 bilaterals. Rejection was highest with AFOs (86.20%). 100% rejection was observed among patients using bilateral HKAFOs and 88.88% in bilateral AFOs. 50% rejection was observed for KAFOs. Association between types of orthoses and rejection was statistically significant ( $p < 0.01$ ). Threshold on doors, step/staircase, high floor level of housing, uneven roads, hilly terrains were observed as important architectural barriers. Rejection was highest in the hilly areas (82.75%).

Reasons for continued uses of orthoses even 1 year of fitment were observed in 41 patients. 26 patients could walk better with orthoses, 11 patients couldn't walk without orthoses, 4 patients felt that orthoses reduced pain and deformity. Again main reasons for rejection / discarding in the remaining 59 patients were lack of significant improvement in mobility with orthoses, architectural barriers, ability to ambulate without orthoses, heaviness, and poor cosmesis, etc. Other reasons were; a) financial difficulties, b) poor social acceptance, c) restriction in activities of daily living and field activities, d) restriction in social and religious places

and functions and e) dependence on others for donning and doffing, etc.

## Discussion :

Inspite of disadvantages like heaviness, poor cosmesis, cumbersome doning and doffing, frequent wear and tear, etc. 41 % of patients were found to be using lower limb orthoses even after one year of fitment. 59% rejected or discarded orthoses mostly during the first three months of fitment. This rejection rate of 59% is comparable to 50-60% reported by Kumar et al<sup>6</sup>, 59% by Sant, 60% by Hariharan et al<sup>7</sup>, 17-50% by Haslok et al<sup>4</sup>, Park and Craxford<sup>5</sup>. Association between rejection and location was statistically significant. Higher rejection rate in the hilly areas (82.75%) can be explained by the fact that hilly terrains act as architectural barrier where significant degree of joints mobility, suppleness of foot is restricted by the orthoses. Above knee orthoses are purely nonfunctional so far as ambulation in hilly areas is concerned. Amar<sup>8</sup> also reported difficulty in walking on uneven surfaces or steep slopes of hills with lower limb ambulation aids. Association between sex and rejection was not significant. Hariharan<sup>7</sup> and Fischer et al<sup>3</sup> also reported a similar finding. Hariharan<sup>7</sup> reported unexplained discard rate among male patients in contrary to our finding where rejection rate was higher in females (82.75%). It may be because of the reason that conventional lower limb orthoses are not suitable for household activities where most of the work is done at the floor level. Presence of closed leather shoe and poor cosmesis could be other contributory factors for higher rejection among females.

Association between age and rejection was not significant. Similar finding was also reported by Hariharan<sup>7</sup> and Fischer et al<sup>3</sup>. higher rejection among patients in the age group above 51 years can be explained by ; a) lack of strength and coordination, b) most of them are hemiplegics who

can ambulate without orthoses because of the unilateral involvement, and c) more association with social and religious activities where shoes are restricted. It was observed that using orthoses in the age group below 10 years was wholly dependent on the initiative and effort of parents, mostly mother. Association between rejection and educational level was significant in contrary to Hariharan's<sup>7</sup> reports. Rejection was highest among no- formal education group (82.76%) and lowest among graduates (28.57%). It was observed that lack of understanding by the parent or patient about the disease has strong impact on discard or rejection.

Association between occupation and rejection was not significant. However, rejection was observed more among labourers, cultivators and housewives who need lots of activities at the ground level. Hariharan<sup>7</sup> reported higher rejection among occupied groups. Poliomyelitis represented highest number of patients. This supported a similar finding by various authors<sup>7,9,10,11</sup>. Association between types of affliction and rejection was not significant. Fischer et al<sup>3</sup> also reported a similar finding. 52.63% (n=10) was observed among paraplegics. Prescribing orthoses for functional ambulation in high level of spinal cord injury patient above D-10 was futile. Rejection among hemiplegics was due to their ability to ambulate without orthoses because of unilateral involvement and in arthritis due to physical intolerance. High rejection among myopathy patients was due to the progressive nature of the disease.

Hariharan<sup>7</sup> reported higher rejection among unilaterally involved cases due to the greater independence that these persons enjoy without the orthoses. Important findings of the higher rate of continued use of orthoses among bilaterals were due to a) initiatives and efforts of the parents among cerebral palsy patients, and d) inability to ambulate without orthoses among paraplegics, etc. Discardal

rate among unilateral and bilaterally involved cases were similar in this study. Among lower limb orthoses, AFOs had highest rejection (86.20%; n=25). This is due to greater independence in ambulation since they are less affected. Hariharan<sup>7</sup> also reported a similar finding. Fischer<sup>3</sup> however reported only 16% discardal. Bilateral HKAFOs usually end in discardal because of difficulty in donning and doffing and greater dependence on others, heaviness, and breakage, etc. Pelvic band should be avoided to reduce dependency in doffing and donning, to minimize weight, frequent breakage to reduce energy consumption<sup>12</sup>. Again lots of flexibility in the joints is needed for ambulation in the hilly areas. Therefore, above knee orthoses are always ended up with discardal, more so in bilateral cases

Architectural barriers such as threshold in doorways, steps, staircases, high basement level of the traditional housing, uneven roads and in addition, the hilly terrain were present for all. Major problem is due to restriction of flexibility and loss of suppleness of foot imposed by the orthoses. Association between rejection and architectural barriers was significant. Saharabudhe et al<sup>2</sup> also reported restriction of mobility of the locomotor disabled due to architectural barriers.

Better walking ability with orthoses followed by inability to walk without orthoses and reduction of pain and deformities were main reasons for the continued uses of orthoses. Varma<sup>11</sup> and Saharabudhe et al<sup>2</sup> reported higher rejection if patients are able to ambulate without orthoses.

Various reasons were given for rejection of orthoses by various authors<sup>2,3,6,7</sup>. Important reasons were; a) heaviness weight, b) takes longer time to fabricate, c) get rusted soon, d) frequent wear and tear, e) cosmetically poor, f) high cost, g) cumbersome, h) physical intolerance( pain, heaviness, ulcer, itching). In the present study, lack of significant improvement in mobility with orthoses,

ability to ambulate without orthoses, heaviness, poor cosmesis were found to be the main reasons for rejection. Other significant reasons were; a) financial problem, b) poor social acceptability, c) restriction in activities of daily living and field activities mostly due to restriction of floor activities, d) restriction in social and religious places, and e) dependence on others for doffing and donning.

This study has highlighted the wasteful expenditure on the design that is not suitable for disabled in the rural areas. Therefore, a careful rethinking in orthoses prescription is to be emphasized. Few suggestions are made to minimize rejection;

a) Prescription of orthoses should be done in an individualized approach keeping in view economic, social, cultural, climatic, religion, local architectural barriers, materials and resources, locally available form of technology<sup>13</sup>.

b) Proper exposure and training should be given for all medical officers involved in rehabilitation care services to avoid unnecessary and incomplete prescription, incomplete or wrong training methods, careless check out, etc

c) Provision of locally available materials and technology should be given priority. Quality, function and cosmesis should never be compromised in the name of low cost appliances to avoid rejection.

d) Use of newer synthetic and lightweight materials which are more acceptable to the patient both functionally and cosmetically should be promoted<sup>14</sup>.

e) A close monitoring of the patient at each stage of orthotic fitting and a regular follow up service should be developed.

f) Hip and knee joints allowing squatting and cross-legged sitting should be made available to all the rehabilitation centers. ALIMCO should take responsibility for mass production and distribution<sup>14</sup>.

g) Legislation to minimize architectural barriers on the existing structures and new constructions

should be enforced<sup>2</sup>.

h) Local artisans should be trained in minor repairing. Provision for improving local infrastructure for minor repair should be considered<sup>7</sup>.

i) Concept of Mobile workshop where a qualified orthotist and rehabilitation technician from central rehabilitation center periodically visits peripheral centers/contact villages, carries out necessary repairs and register for fresh orthoses should be implemented.

More and more labour should be given to develop concept of community based rehabilitation and to establish community involvement and participation, thereby making this programme self sustainable without much external support. It would help patients in many ways such as; a) reduce social isolation problem, b) nonavailability of accompanying person for visiting rehabilitation centre, c) some free time to the members of the family to earn their livelihood, d) financial problems to a certain extent, e) minimizing architectural barriers in the community, f) socializing person with disabilities, etc.

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