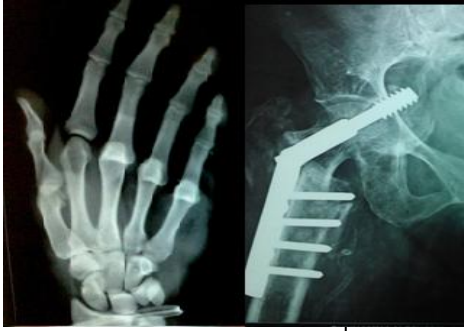




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Reaching the unreached regarding light weight artificial limb prosthesis production and utility-a success story from world's largest publicly funded national health insurance program- ABPMJAY

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Abstract

Background: Amputation is a major cause of locomotor disability in India, yet only a small proportion of individuals have access to prosthetic devices. Government health insurance schemes like Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (ABPMJAY) and Tamil Nadu Chief Minister Comprehensive Health Insurance Scheme (TNCMCHIS) aim to improve access for socioeconomically disadvantaged populations.

Aim: To analyse the effectiveness of ABPMJAY-TNCMCHIS in providing prosthetic rehabilitation through Coimbatore Medical College Hospital (CMCH), especially for patients below poverty line in unreached districts of Tamil Nadu.

Methods: A retrospective study was conducted at the Institute of Orthopaedics and Traumatology and Department of Physical Medicine and Rehabilitation, CMCH, between August 2020 and April 2025. All 213 patients with amputations who received prostheses under ABPMJAY-TNCMCHIS were included. Pre- and post-prosthetic rehabilitation involved physiotherapy, occupational therapy, psychological counselling, and vocational rehabilitation.

Results: Of 213 beneficiaries, 82.7% were men and 17.3% women, with a mean age of 55 years (range 3-85). Below-knee amputations (118) were most common, followed by above-knee (72), below-elbow (12), and above-elbow (11). The total claim amount was ₹92.56 lakhs, while actual expenditure was ₹37.27 lakhs, generating a net saving of ₹55.90 lakhs for the government. Beneficiaries came from 20 of 38 districts, covering a mean distance of 223 km from Coimbatore.

Conclusion: The Coimbatore model demonstrates that government-funded insurance schemes can successfully deliver cost-effective prosthetic rehabilitation while generating surplus revenue for infrastructure development. This approach not only restores mobility but also improves quality of life, reduces social and economic dependence, and sets a replicable model for universal prosthetic rehabilitation in India.

Keywords: Government health insurance, ABPMJAY, TNCMCHIS, Coimbatore model

Introduction

Amputation is a significant cause of Loco motor disability in India, with prevalence estimate suggested approximately 62 amputees per 100,000 population in India, translating to nearly 1 million individuals living with amputations nationwide.

In developing countries like India, trauma is the primary cause of limb amputation, especially among younger individuals. Complications from diabetes and peripheral vascular disease are next significant contributors to limb amputations in India.

Despite the high prevalence of amputations, only a small percentage (around 5%) of individuals has access to prosthetic devices. Government-sponsored health insurance schemes can play an important role in improving the reach of healthcare services.

TNCMCHIS (Tamil Nadu Chief Minister Comprehensive Health Insurance scheme) was established in Tamil Nadu on July, 2009 long before ABPMJAY was introduced all over India. In September 2018, the Indian Government announced world's largest publicly funded national health insurance program- Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (ABPMJAY) for improving access to hospitalization services for under privileged socioeconomically poor population in India. The

TNCMCHIS scheme was later integrated with ABPMJAY.

This study highlights the accessibility to prosthetic healthcare, without any expenditure through ABPMJAY-TNCMCHIS insurance in Tamil Nadu, enabling the Government Medical Colleges to set milestone in uplifting the Quality of Life of Patients with Amputation by providing Rehabilitation and examines the responsiveness of ABPMJAY-TNCMCHIS by measuring the prompt attention in service delivery and utilisation with access to information by the beneficiaries.

Materials and methods

The Study was conducted in the Institute of Orthopaedics and Traumatology and Department of Physical Medicine and Rehabilitation, Coimbatore Medical College & Hospital. It is a retrospective study conducted from August 2020 to April 2025.

The aim of our study is to analyse the effectiveness of ABPMJAY- TNCMCHIS in providing artificial limbs produced in Coimbatore Medical College Hospital (CMCH), Coimbatore to the persons below poverty line in the unreached districts in Tamil Nadu.

The objective of the study is to know the effectiveness of Multidisciplinary approach used in artificial limbs production centre, CMCH and to understand and execute the Comprehensive way of Pre and Post Prosthetic Rehabilitation by effectively utilising the Physiotherapy, Occupational Therapy, Clinical Psychology counselling and Vocational counselling services so that the individual become useful member of Family and Community to stand and walk and earn on their own.

Result

The Total number of persons received artificial limbs under ABPMJAY CMCHIS were 213.

Out of the 213 study population-, 82.7% were men and 17.3% were women with mean age of 55 years. The Youngest was 3 years old male child and the Eldest was 85 years old female.

In our study, Below knee amputations were more with 118 patients followed by 72 Above knee amputations, 12 Below elbow, 11 above elbow amputations were benefitted. Regarding the lower limb Transtibial prosthesis was given to 118 beneficiaries and Transfemoral Prosthesis to 72 beneficiaries. Regarding upper limb 12 Transradial and 11 Transhumeral Prosthesis were provided.

Discussion

The uniqueness of this project in Coimbatore is the Light weight Artificial Limb Production centre was upgraded without direct investment from Government, by effective recycling of Orthopaedic ABPMJAY-TNCMCHIS fund. With the available resources, to motivate the children to use artificial limbs -customised indigenous colour socket imprinting method was used without hi-tech 3 D Printers, by utilising light weight durable thermoplastics without any incurring expenditure, through Government funded insurance. In India, regarding artificial limbs, the private companies are enjoying the benefits of the financial gains from AB-PMJAY. TNCMHIS. In our Coimbatore model, it's not only reaching the unreached but also generating profit to the government which is used for infra-structure development. This comprehensive interdepartmental, Multidisciplinary rehabilitation program is being carried out to make sure that the artificial limb fitting is used properly by improving the mental strength of beneficiaries enabling 24 x 7 service which is not provided by private vendors.

Conclusion

This novel idea of converting an Expenditure Model to a Revenue generation concept being started by Prof. Dr. Vetrivel Chezian has set a high standard as a Prima Facie in Peripheral Government Medical Colleges of Tamilnadu, being a Forerunner example in travelling towards strengthening the Health and Rehabilitation systems and how well they can transform lives of the needy beneficiaries and give them new lease of life.

Introduction

Amputation is a significant cause of Loco motor disability in India, with prevalence estimate suggested approximately 62 amputees per 100,000 population in India, translating to nearly 1 million individuals living with amputations nationwide [3].

In developing countries like India, trauma is the primary cause of limb amputation, especially among younger individuals [2]. Complications from diabetes and peripheral vascular disease are next significant contributors to limb amputations in India [8, 10].

Despite the high prevalence of amputations, only a small percentage (around 5%) of individuals has access to prosthetic devices Government-sponsored health insurance schemes can play an important role in improving the reach of healthcare services [9, 11].

TNCMCHIS (Tamil Nadu Chief Minister Comprehensive Health Insurance scheme) was established in Tamil Nadu on July, 2009 long before ABPMJAY was introduced all over India.

In 2018, the Indian Government announced world's largest publicly funded national health insurance program-Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (ABPMJAY) (Figure 1) for improving access to hospitalization services for under privileged socioeconomically poor population in India [4, 5]. The TNCMCHIS (Figure 2) scheme was later integrated with ABPMJAY on September 2018.

Efforts to make prosthetic limbs more affordable and accessible were critical, especially for rural and economically disadvantaged populations. In India persons with amputations living in and around Metro cities were enjoying the light weight artificial limbs long back. Higher end prosthetic limbs were beyond the reach of the common man in low income settings before 2020, where the Sub urban and rural persons with amputations away from Chennai in Tamil Nadu were not benefitted with light weight prosthesis. We tried our best to synchronise the possibilities of propagating light weight artificial limbs which were once a dream to the financially underprivileged deserving individuals in various districts of Tamil Nadu.

This study highlights the accessibility to prosthetic healthcare, without any expenditure through ABPMJAY-TNCMCHIS insurance in Tamil Nadu, enabling the Government Medical Colleges to set milestone in uplifting the Quality of Life of Patients with Amputation by providing Rehabilitation and examines the responsiveness of ABPMJAY-TNCMCHIS by measuring the prompt attention in service delivery and utilisation with access to information by the beneficiaries.

Materials and methods

The Study was conducted in the Institute of Orthopaedics and Traumatology and Department of Physical Medicine and Rehabilitation, Coimbatore Medical College & Hospital. It is a retrospective study conducted from August 2020 to April 2025

All patients with amputations who had been benefitted with prosthesis under ABPMJAY-TNCMCHIS scheme -were included for the study. Of the 213 patients who received prosthesis-174 were men and 37 were women and 2 children in the age group of 3 to 14 were included. Persons without loss of limbs are excluded from our study.

The aim of our study is to analyse the effectiveness of ABPMJAY- TNCMCHIS in providing artificial limbs produced in Coimbatore Medical College Hospital (CMCH), Coimbatore to the persons below poverty line in the

unreached districts in Tamil Nadu.

The objective of the study is to know the effectiveness of Multidisciplinary approach used in artificial limbs production centre, CMCH and to understand and execute the Comprehensive way of Pre and Post Prosthetic Rehabilitation by effectively utilising the Physiotherapy, Occupational Therapy, Clinical Psychology counselling and Vocational counselling services so that the individual become useful member of Family and Community to stand and walk and earn on their own.



Fig 1: Logo of ABPMJAY



Fig 2: Logo of TNCMCHIS

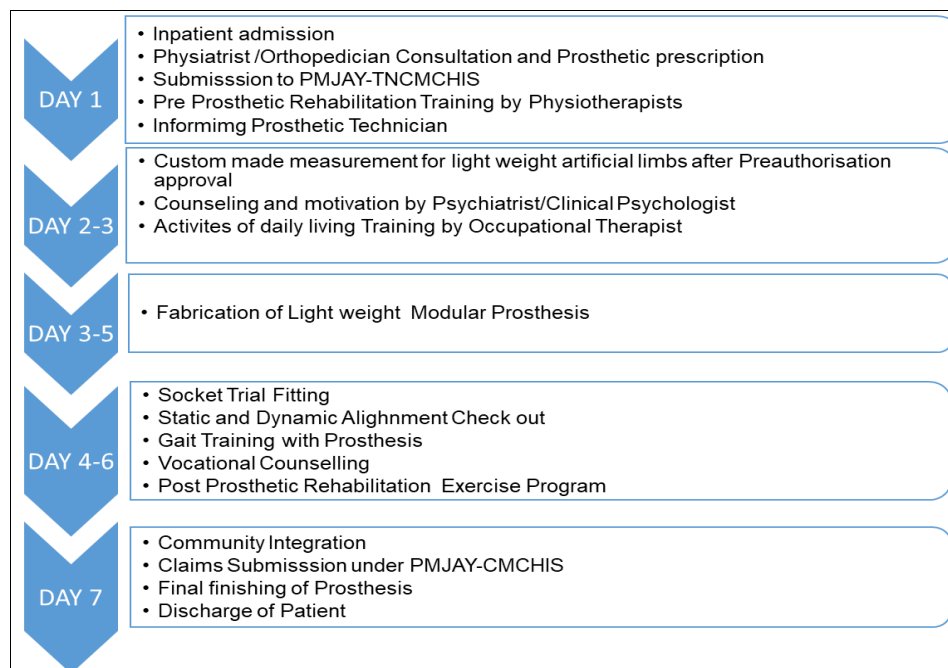


Fig 3: Multidisciplinary Approach Protocol

The pre prosthetic rehabilitation steps include the acute post amputation phase of immediate post-operative rigid casting followed by Sub acute peri prosthetic rehabilitation training including physiotherapy-breathing exercises/endurance training, strengthening exercises to crutch muscles and weight bearing muscles of lower limbs. The indicators for quality control lies in the production of light weight artificial limbs for ambulation of differently abled individuals from one place to another for doing their activities of daily routine. This is made possible by implementing the following comprehensive interdepartmental, Multidisciplinary rehabilitation program.

Results

The Total number of persons received artificial limbs under ABPMJAY CMCHIS were 213.

Out of the 213 study population-,82.7% were men and 17.3% were women with mean age of 55 years. The Youngest was 3 years old male child and the Eldest was 85 years old female.

In our study, below knee amputations were more with 118 patients followed by 72 Above knee amputations, 12 Below elbow, 11 above elbow amputations were benefitted (Figure-4). Regarding the lower limb Transtibial prosthesis was given to 118 beneficiaries and Transfemoral Prosthesis to 72 beneficiaries. Regarding upper limb 12 Transradial and 11 Transhumeral Prosthesis were provided.

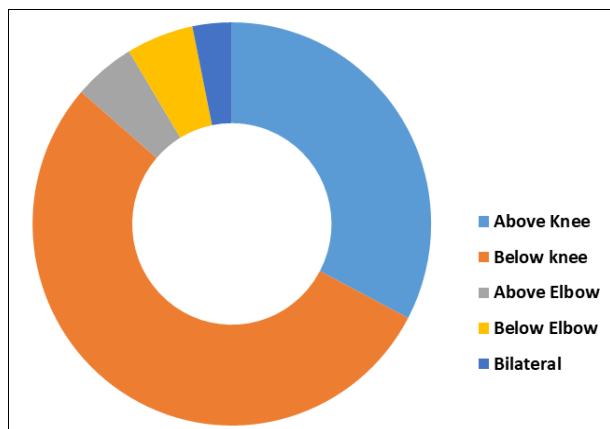


Fig 4: Total Beneficiaries (213)

Table 1: Mean Duration

Mean Parameters	Duration(days)
Pre authorisation approval time	3
Prosthesis Fabrication time	2.5
Gait Training time	3
Limb discharge	7
Claims approval	6
Hospital stay	7
Return to work	20

Mean time for preauthorisation approval was 3 days. Mean hospital stay was 7 days and the mean time to return to work was 20days (Table1).

Table 2: Net financial gain

Prosthesis type	Beneficiaries	Claim Amount (Rs)	Profit (Rs)	Actual cost of components (Rs)	Profit Percentage
Above Knee(Transfemoral)	72	48,44,024	28,68,244	19,75,780	59.21%
Below Knee(Transtibial)	118	30,85,060	18,32,260	12,52,800	59.39%
Above Elbow(Transhumeral)	11	7,57,747	5,07,171	5,73,220	50.48%
Below Elbow(Transradial)	12	5,70,000	3,82,534	1,87,466	67.11%
Total	213	92,56,831	55,90,209	37,27,266	60.39%

For 72 transfemoral Prosthesis the claim amount was Rs 48,44,024/- for 118 Transtibial Prosthesis the claim amount was Rs 30,85,060, for 11 Transhumeral Prosthesis the claim amount (Figure 5) was Rs 7,57,747/- and for 12 Transradial Prosthesis the claim amount was Rs 5,70,000. The total claim

amount was Rs92,56,831 and the actual cost spent was Rs 37,27,266 and the profit to government was Rs 55,90,209(Table2).

We have served beneficiaries from 20 out of 38 districts of Tamilnadu, covering an average of 223 kms as Mean Service area covered from Coimbatore (Figure 6).

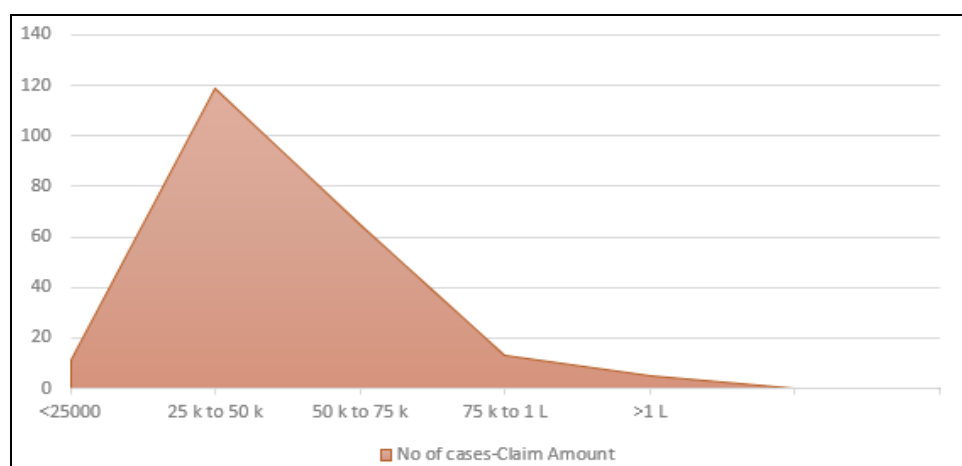


Fig 5: Claims Amount

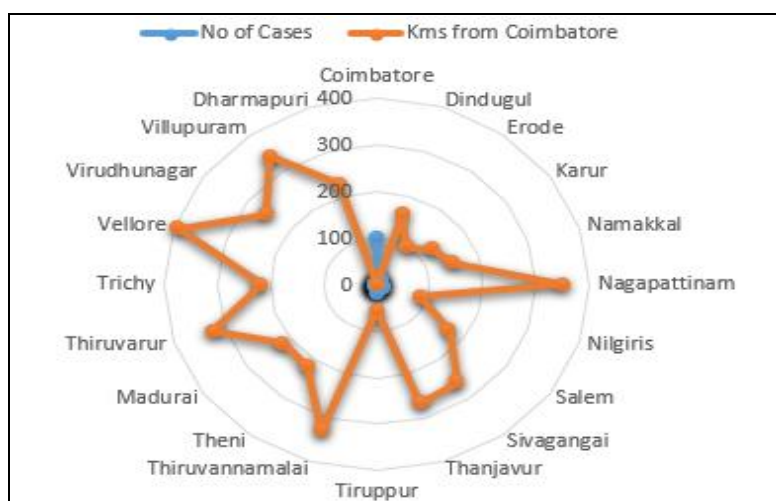


Fig 6: Districts served

Discussion

Coimbatore Medical College was started in 1966. It is the Medical hub for western part of Tamil Nadu and Kerala. Till 2020 patients have to travel to Chennai to get Artificial Limbs which is not possible for Below poverty line persons due to economic reasons.

The uniqueness of this project in Coimbatore is the Light weight Artificial Limb Production centre was upgraded without direct investment from Government, by effective recycling of Orthopaedic ABPMJAY-TNCMCHIS fund. 10 beds in orthopaedic ward were marked for inpatient prosthetic fitting services. The Prosthetic Technicians and other Rehabilitation Team members were motivated to start the Project in the middle of Covid Pandemic. The First Prosthesis was provided to a Female with amputation due to Diabetic Foot on August 15, 2020. This novel idea was executed by Prof Dr Vetrivel Chezian after approval by Dean in Charge Prof Dr Kalidas^[1, 12].

With the available resources, to motivate the children to use artificial limbs -customised indigenous color socket imprinting method was used without hitech 3 D Printers, by utilising light weight durable thermoplastics without any incurring expenditure, through Government funded insurance. In India, regarding artificial limbs, the private companies are enjoying the benefits of enjoying the financial gains from AB-PMJAY. TNCMHIS. In our Coimbatore model, it's not only reaching the unreached but also profit to the government which is used for infra-structure development.

Moreover, in Coimbatore model, comprehensive interdepartmental, Multidisciplinary rehabilitation program to make sure that the artificial limb fitting is used properly by improving their mental strength, 24 x 7 service which is not provided by private vendors. (Table-3)

The advantages on getting the prosthesis fabricated from Government Artificial limb centre over non-Governmental/outsourced ones are tabulated as follows

Table 3: Advantage of Prosthesis fabricated in Government Institutions

Key Factors	Government fabricated Prosthesis	Private/Outsourced Prosthesis
Multicentric standard approach	Possible	Not possible
Locally available Rehabilitation outreach	Possible	Not Possible
In patient gait training by trained Therapists	Possible	Not possible
Interdepartmental care	Possible	Not Possible
Inpatient Pre and post Prosthetic Rehabilitation Exercise training	Available	Not available

By implementing the idea of providing artificial limbs to persons in unreached districts the Economic situation is addressed, educational drop out can be prevented, so that the Individual will be able to stand and walk on his own, integrating him into the community as a useful member, thereby the main objective of the study is achieved.

At current levels of utilisation, the Government hospitals in Tamil Nadu gain a net annual financial benefit which can potentially increase, with an increase in the share of patient volume with increased utilisation. (6)

Evident rise in patients getting prosthesis through AB-PMJAY is making Prosthetic fitting as an affordable and achievable dream for financially deprived patients, post

regulation of prosthesis prices & AB-PMJAY^[6]. Around 39.88% of the households not having Ayushman Bharat scheme has faced financial burden because of health care expenditure^[8].

Experience from India may have lessons and learnings for other low and middle-income countries to strengthen rehabilitation healthcare in journey towards universal health coverage^[8].

Conclusion

After 5 years of strenuous efforts, we have reached distance covering Mean 225 kilometres radius from Coimbatore covering 213 beneficiaries. It is being done without any waiting list in Coimbatore with the goal to reach throughout Tamil Nadu which will be the Pinnacle of Prosthetic Rehabilitation with Light Weight Modular Artificial limbs. When the aforementioned breakthrough being done in Tamil Nadu, It can be done as a working possibility of doing without waiting list all over India. Wish the day is not so far as we keep progressing.

Person who lost all 4 limbs was fitted with prosthetic limbs and made to walk on his own though ABPMJAY and become an entrepreneur. Similarly, 7 beneficiaries with Bilateral upper /lower limb amputations have been genuinely benefitted with artificial limbs. This have changed the life style of the common man from dependence to independence. Dependency of the person lost their limbs lead to school drop out by the family by the family members to take care of the dependent person and break in the family life among the person lost their limbs. Hence artificial limb has uplifted their families in the social and economical way.

Since it is a government funded insurance for people below poverty line this project, is going to there forever benefitting the common public.

This is the First study in Tamil Nadu with larger study group of 213 beneficiaries obtained artificial limbs under ABPMJAY-CMCHIS. A Multicentric study is necessary in future for further validation and alignment of standard study protocol.

Conflict of Interest

Not available

Financial Support

Not available

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