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Paddy Thresher Injuries Causing Lower Limb Amputations in Cauvery Delta Region

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ABSTRACT

Agricultural injuries are under reported. This work was aimed to define causes that led to the lower limb loss in paddy thresher injuries. The design of the study was a follow-up of the recipients of artificial limb from our facility a tertiary care centre. From a questionnaire given to 18 lower limb amputees who lost their limbs due to thresher injuries (of the total 35 cases presented to us) it was found that most victims were less educated males who had below knee amputations; injured late in afternoon tired; being tired they sat on the top loading machine and pushed the paddy stalks with their legs into a thresher drum which was run by power from a diesel engine. None of them had any formal training There is a need to change farm practices to significantly reduce paddy thresher injuries.

Keywords: Agricultural, mechanization, Paddy -thresher, lower limb -Amputations, Injuries, Harvesting

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INTRODUCTION

A congenital loss of limb is better tolerated than an acquired loss of limb [1]. Occupational injuries share a role in loss of limb in an adult with accidental injuries. [2] With 70% population reliant on it, agriculture is the principal profession of India. [3] In Tamilnadu, the main food crop in the gross cropped area of around 63 Lakh Hectare (of the total area of 1.3 Lakh sq.km) is paddy. This is because rice is the main staple food of the state. Cauvery river delta with Thanjavur and its adjoining districts account for the share of paddy output of Tamilnadu. Based on the duration; there are three types of crop. The first one is the 'Kuruvai' (the short term crop) has a duration of three and a half to four months. Thaladi' the second crop has duration of five to six months: 'Samba' a duration of almost six months. Kuruvai usually is between June - July to October /November. Thaladi' October - November to February – March and Samba is from August to January. [4] Threshing separation of paddy kernels from the panicle. 'In olden days threshing was crudely done by rubbing or trampling by livestock over the harvested crop animals or tractor, beating it with pestle to separate the grains. This results in more wastage and slows down the process and ends in low production. Recently threshers are used and they involve impact and to some degree stripping. The crop can be either held and threshed or thrown in the thresher. Using machines which run on electricity or fossil fuels in the past few decades has increased output per worker and more crop is processed in less time [5-7]. The burden of harvesting more crops is the result of novel rice varieties, fertilizers and pesticides [8]. In the tropics, in harvesting and threshing, labor intensive manual operations are slowly substituted to mechanization. [9]

Urbanization and movement of labourers to urban areas is rampant in India. This causes less men to do agricultural work with dependence on primitive farm machinery especially paddy threshers. They are overworked, fatigued; lose attentiveness and dexterity while using paddy threshers. This results in a more man-machine interface, more injuries and loss of limbs causing agony to the individual and the family. Paradoxically Food and Agriculture Organization and United Nations Organization which brought advancement in mechanization in the third world countries in 2005 have decided to cut down the department of advancement in mechanization in these countries [10]. In a study, while more farm mechanization was found to be in northern India, accidents were more in the villages of southern India [11]. However the true scenario of agricultural injuries are worse than official statistics [12]. Such injuries are under reported for various reasons [13, 14]. There is no published work from any tertiary centre of South India analyzing such injuries. The need is to have an arrangement that ensures safety in all the farm activities. To evolve an arrangement first we need to have data that reflect the major problem of this occupational hazard in our region.

Aim

The aim is to analyze the nature of paddy-thresher injuries (PTI), in amputees who received artificial limbs from our artificial limb sub centre. The analysis is to find the circumstances that led to these injuries, results of their treatment and rehabilitation, impact on the families and possible ways of preventing such injuries.

Methodology

This study was done in a tertiary referral centre and a medical college. The college was selected for high agricultural activities and use of modern technology on farms in the surrounding districts and the main crop was paddy. The recipients of prosthetic limbs for lower limb amputation were listed from our Artificial Limb Sub Centre. Mails were sent to these recipients with reply card requesting them to come with all available records. 35 patients responded by coming to our out-patient clinic. Of these 18 were due to PTI and rest 17 were due to other causes. All the 18 PTI victims were given a questionnaire regarding their age in years, sex, level of amputation, their education level, time of the day when the PTI accident occurred, any formal instructional training given to operate the thresher, machine type, the part of the machine that caused the injury, power source for the thresher. They were also asked about what they were doing during the PTI incident. They were also asked about other specific complaints regarding stump and about comfort with current prosthesis. They were examined with specific attention to the level of amputations and the qualities of stumps. All these patients were photographed, their discharge summaries were perused. These details are tabulated in table 1. Afterwards we inspected 20 threshers also to assess the real work site atmosphere. These work spot details were evaluated with the type of threshers implicated in the above 18 PTI cases to identify the reasons for these injuries. From this information, a safer practice of paddy threshing was proposed.

The other 17 patients who responded by coming directly to our out patient department, lost their limb by causes other than PTI (OTPTI). Majority (13) of them were due to road accidents, two were due to Thrombo Angitis Obliterans (TAO) and one each due to a coir industry accident and an amputation for a squamous cell carcinoma of foot. One patient in this group was not happy with the stump and wanted re-surgery. Another patient of the same group felt that an artificial limb given to him was not fitting and wanted to change it. The bilateral amputee, a TAO patient who had amputation also had undergone lumbar sympathectomy. We also had 35 reply mails with answers like 'not due to paddy thresher' (three), 'lorry accidents' (10), 'bus accidents' (two), 'other road accidents' (eight), 'due to Diabetes Mellitus' (seven), 'two-wheeler accident' (two), one each from a 'fall from height', 'from a share auto' and from an 'auto rickshaw'. 14 mails were returned with remarks like 'no such person' or 'insufficient address'. Three mails were returned with note that the addressees were sick to travel or nobody was available to bring them to the hospital or they lost old discharge summary of the hospital. Three mails were returned with note that the patients have died.

RESULTS

Details of all 18 PTI patients are presented in table 1. One PTI victim who was given artificial limb is also seen in figures 1 and 2. All of them are males mostly in the fourth and fifth decade. None of them have crossed tenth standard. Ten were totally uneducated. Two passed fifth, one passed seventh, one passed eighth, two passed ninth standards. One each passed 4th and third standards. Only three of 18 had their injuries in the forenoon. 15 had their injuries in afternoon. They being tired sat on the top loading machine and pushed the paddy stalks with

their legs into a thresher drum which was run by power from a diesel engine. None of them had any formal training. Most common site of their amputation was below knee amputation. One of the victims who came in person is shown in figure 1 and after fitting his artificial limb is seen in figure 2.

Table 1:Patients who lost their limb in PTI

Case no	Age in years	sex	Level	Education	Time of the day	Training	Machine type	Machine part	Power source
1	65	M	BK	Nil	6.30pm	No	Top	Threshing drum	Diesel motor
2	60	M	BK	Nil	2 pm	No	Top	Threshing drum	Diesel motor
3	55	M	BK	3RD	8 am	No	Top	Threshing drum	Diesel motor
4	60	M	BK	NIL	4 pm	No	Top	Threshing drum	Diesel motor
5	35	M	Through Knee	9 TH	4 pm	No	Top	Threshing drum	Diesel motor
6	45	M	Forefoot	NIL	4 pm	No	Top	Threshing drum	Diesel motor
7	55	M	BK	NIL	6pm	No	Top	Threshing drum	Diesel motor
8	41	M	BK	5TH	5pm	No	Top	Threshing drum	Diesel motor
9	31	M	BK	5TH	6.30 am	No	Top	Threshing drum	Diesel motor
10	39	M	BK	4 TH	4.30pm	No	Top	Threshing drum	Diesel motor
11	57	M	BK	Nil	1pm	No	Top	Threshing drum	Diesel motor
12	30	M	BK	7TH	1pm	No	Top	Threshing drum	Diesel motor
13	45	M	BK	Nil	2.15 pm	No	Top	Threshing drum	Diesel motor
14	24	M	BK	8 th	3pm	No	Top	Threshing drum	Diesel motor
15	50	M	BK	Nil	11 am	No	Top	Threshing drum	Diesel motor
16	26	M	Forefoot	9 th	2pm	No	Top	Threshing drum	Diesel motor
17	27	M	BK	Nil	2pm	no	Top	Threshing drum	Diesel motor
18	19	M	BK	Nil	2pm	No	Top	Threshing drum	Diesel motor



Figure 1



Figure 2

Figure 1: A Paddy Thresher Injury victim below knee amputee his mail seen on the table.

Figure 2: The Paddy Thresher Injury victim seen in Figure 1 is shown with his artificial limb fitted in our artificial limb sub centre.

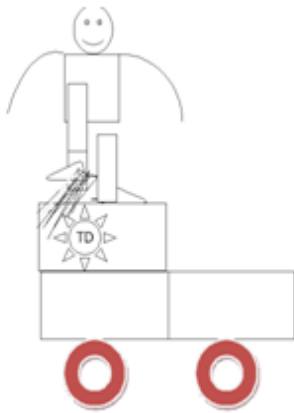


Figure 3

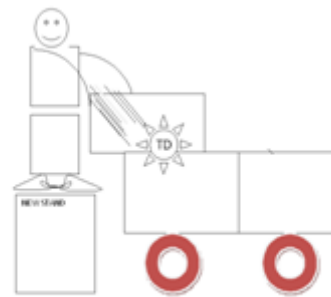


Figure 4

Figure 3: Present practice of pushing the crop with lower limbs. TD is the thresher drum
 Figure 4: Recommended safe practice of feeding the stalk with upper limbs standing on a separate stable platform. TD is the thresher drum

DISCUSSION

In a study, limited use of safety devices on machinery during farm operations was associated with higher risks for injury and also interestingly lower routine maintenance scores were associated with significantly reduced risks for injury. This would mean machine maintenance itself is a risk factor, or that more modern equipment that requires less

maintenance places the operator at lower risk. In the same study it was noted that “most entanglements occurred during a few machinery-related tasks, like (1) field adjustments of machinery,(2) product handling and conveyance; and (3) Driveline attachments and servicing. Both expected and unanticipated hazards inherent to these tasks affected the behavior of farmers, leading to entanglements” [15]

Threshers widely used in India involve in a significant proportion of limb crush injuries. Safety standards are rather difficult to implement as (i) the population is still illiterate (ii) Threshers are manufactured in local workshops and used for post-harvesting operations, needing manual assistance [16]. Agriculture is the basic industry which provides food for human existence. Mechanization did not cause unemployment but increased other employment opportunities. Only 1 % of agricultural production was invested in mechanization [10]. Though much attention is given to the promote rice production there is less concern for post harvest practices in rice cultivation [17]. A prior focused work to prevent thresher injuries of upper limb, recommends a safe, cost effective, improved chute design, based on ergonomic principles, increased chute heights and chute cover lengths, a stable platform with height difference of platform and chute [16]. However in our set up the part of limb lost is due to the habit of the workers standing on the thresher to push the crop. This practice and the non manufacturing of upper limb prosthesis in our centre made us to include the lower limb amputations only. We have only questioned and examined those lower limb amputees who responded to our mail. From this study it was found that PTI is the single largest cause accounting for more than 50% of the lower limb amputees and the remaining 50% were due to road accidents, vascular afflictions, malignancies etc all put together. The information collected from all 18 PTI victims confirms one main problem. It was their method of feeding the crop. All of them were sitting on the thresher machine to push the stalk as depicted in figure 3 which is preventable. Instead the worker shall be asked to stand on a separate platform to feed the crop as shown in figure 4 with their upper limbs as already worked out [16]. Interventions like strict supervision of thresher operations by agricultural department personnel are needed.

To read the instruction manuals of threshers and understand them, basic education is a prerequisite. Akin issuing driving licence for driving light motor vehicles, formal training and licensing should be done to control these operators. Only such trained and licenced personnel should be allowed to operate a paddy thresher. They should have fixed working hours, adequate sleep and should abstain from alcohol. It is proposed that a temperature sensitive controller be installed in the chute so that it will stop the motor of the thresher automatically when a part of body or limb enters the machine. The harvester is a useful machine which even in the presence of flooding can harvest and separate grains and deliver with less man power. They can be bought by the government to reduce these injuries. Added advantage of a harvester is less grain wastage.

CONCLUSION

In this study done to measure the incidence of PTI in our institution, it was found that half of lower limb amputees group who received artificial limb from our centre have lost their

limb due to PTI mainly due to the faulty practice of threshing sitting on the paddy thresher when they were tired during the afternoon. Educating the users and providing literacy are long term measures. However instituting strict safety practices might prevent such injuries in the near future.

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