

Non-adherence to steroid therapy in leprosy reaction and neuritis

SURESH MANI*, JOYDEEPA DARLONG**,
ANNAMMA JOHN*** &
PITCHAIMANI GOVINDHARAJ****

* *Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia*

** *Deputy Superintendent, Purulia Leprosy Home and Hospital,
Purulia, W.B, India*

*** *Head – Research & Training, The Leprosy Mission Trust India,
New Delhi, India*

**** *Physiotherapist, Purulia Leprosy Home and Hospital,
Purulia, W.B, India*

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Introduction

Nerve Function Impairment has been a prime hallmark of Type 1 Reaction in leprosy, which often leads to deformities and disability if not treated effectively.¹ Steroid has been a drug of choice to treat severe reactions and nerve damage since the mid-20th century. The recommended therapy regimen starts with 40mg per day for 2 weeks, followed by subsequent tapering for 12 weeks.² Although the optimal dose and duration of therapy are still being studied, steroid is generally accepted as the standard treatment. It is evident from published articles that oral steroid therapy may reverse nerve function impairment up to 50 – 70%.^{3–5} Therefore completing appropriate courses of steroid therapy may improve the function of involved peripheral nerves, and prevent the development of secondary deformity. For many therapeutic regimes in chronic disease like hansen's and tuberculosis (Multi-drug therapy and WHO oral steroid therapy), poor adherence affects the clinical outcome and results in a considerable financial burden on society and modern health care system.⁴

Non-adherence to steroids may affect the recovery of the involved nerves and lead to secondary deformities. Early detection and treatment for nerve function impairment is the fundamental concept in leprosy.⁵ A previous study reported that 10% of patients with leprosy showed signs of motor, sensory and autonomic neuropathy at the time of registration for MDT.⁶ Nerve function impairment in the diagnosis has been found to be a stronger risk in the development of reaction and sensory and motor neuropathy. Each patient undergoes regular nerve function assessment such as voluntary muscle test (VMT) and monofilament test

Correspondence to: Suresh Mani, Universiti Kebangsaan Malaysia, Malaysia (e-mail: vemsuresh@gmail.com)

(MFT).⁷⁻⁹ The patient had been treated with oral steroid therapy for any new nerve function impairment which had been detected during nerve function assessment. However, a significant percentage people with leprosy-related nerve impairment reported a lifelong function and social disability that interrupts their daily activities.¹⁰ The concept of early detection and treatment is a failure if the core outcome is reported to be impairment and disability. Therefore, adherence to oral steroid therapy may reverse the nerve functional impairment and consequently minimize the physical and social disabilities.

The Leprosy Mission Hospital, Purulia is a major referral centre in rural West Bengal providing primary, secondary and tertiary level care for leprosy and its complications. Patients with a reaction and neuritis are managed with oral steroids, which are detected by nerve function assessment conducted on the first and every subsequent visit. In order to improve the adherence to oral steroid therapy, various strategies were employed. Each patient is counseled with the aim of ensuring adherence to steroid therapy and given a steroid card with details of dose and duration. There is also a system in place to admit the newly diagnosed leprosy patient for one day for orientation about the disease, treatment, self-care, exercise and early reporting of reaction and neuritis if it occurs.

All patients with recent leprosy reaction and acute neuritis are admitted to the hospital for investigations, initiation of therapy, physiotherapy, advised about side effects and the need for compliance, the role of tapering doses, and counseling. A separate steroid register was maintained for all the patients put on steroids to track their adherence to therapy.

Each patient was given a predesigned card to indicate that he/she was on oral steroid therapy. There are instructions about consulting other doctors if need be and the importance for that doctor to know the prescribed dose. At each hospital visit, patients were screened for hypertension, diabetes mellitus and other side effects and managed appropriately. Patients who defaulted for more than 15 days were invited through letters and phone calls to continue their treatment.

All the aforementioned strategies were employed to improve the patients' adherence to oral steroid therapy. However, based on hospital steroid registers 22.4% (245/1096) of patients had defaulted from steroid therapy between January 2011 and June 2013. This statistic clearly indicated that other factors may be associated with steroid defaulting. Therefore, the study was conducted to explore the factors that cause non-adherence to steroid therapy.

Methods

SETTING

This retrospective study was conducted at The Leprosy Mission Hospital, Purulia, which is in one of the more socio-economically backward districts of West Bengal, India. It is the largest referral centre for leprosy in the state and provides services for skin disease, general medicine and general disabilities including physical and visual disabilities.

STUDY POPULATION

The study population included the patients who had defaulted and those who completed their oral steroid therapy for leprosy reaction and/or neuritis. A patient was considered to have defaulted when he/she did not return to hospital for steroid therapy for more than a 4-week

period. Patients who defaulted on steroids were compared with patients who completed their course of steroids, from the same geographical area to identify and associate the factors, which affect adherence to steroid therapy.

SAMPLE

Purposive sampling was done for this study: all patients who started steroid therapy between January 2013 and July 2013 (7 months) within the district were listed. A total of 66 steroid defaulting patients were identified and included in the study (Figure 1).

In addition, from the list, 66 steroid completed patients (total = 137) who matched location, travel time to hospital and medical facilities, but had completed oral steroid therapy were included. Other relevant data was collected from the integrated hospital management system (HMS) such as address and phone numbers, demographic, clinical and treatment details.

SEMI-STRUCTURED QUESTIONNAIRE DESIGN AND DATA COLLECTION

The interview was based on a semi-structured questionnaire developed for the study. This was piloted before the actual interviews and covered demographic characteristics, leprosy type (MB/PB), family support, perceived stigma, knowledge of leprosy reactions and importance of steroid therapy and reason(s) for defaulting from steroid therapy. The visual numerical scale was used to quantify the impact of family support, stigma, health education, economical burden and the reason for defaulting steroid therapy. A study field investigator was oriented in interviewing techniques before visiting the patients' homes to conduct interviews. During the patient home visit, field staff explained study objectives and obtained patient consent before starting the interview. The same questionnaire was used for those patients who had completed their steroid treatment.

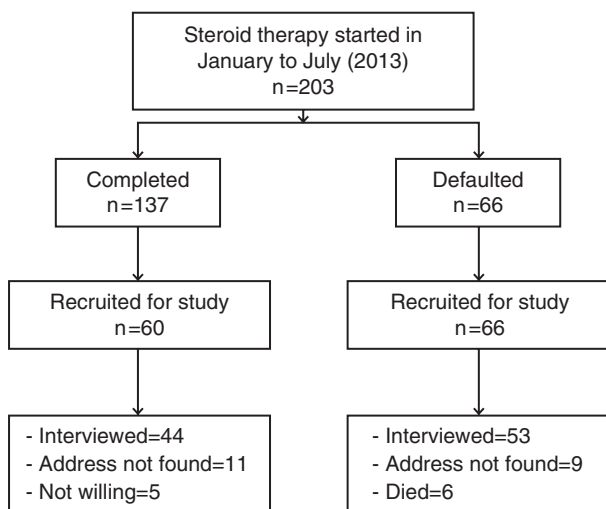


Figure 1. Flow chart describes patient distribution in steroid completed and default groups.

SCREENING OF ACTIVITY LIMITATION AND SAFETY AWARENESS (SALSA) AND P-SCALE

When the field paramedical staff visited for the interview, participation restriction and activity limitation were evaluated using the *P*-Scale and SALSA (Screening Activity Limitation and Safety Awareness) scale respectively. The SALSA scale score ranges from 0 to 80. A higher score indicates greater limitations in the activity of daily living of a leprosy patient, and categorised as none, 10–24; mild, 25–39; moderate, 40–49; severe, 50–59; and very severe, 60–80.^{11–13}

Ethical clearance for the study was obtained from The Leprosy Mission research ethics committee. All the data were entered into a Microsoft office database and analysed with the SPSS software 20.0 version for Windows.

Results

The study sample consisted of 97 leprosy patients diagnosed for neuritis and or reaction treated with oral steroid therapy.

SOCIO-DEMOGRAPHIC PROFILE

Of the total of 97 individuals, the 'defaulter' group consisted of 53 patients, (37 male, 16 female, mean age 32.1 years (range 11–65 years) and the completed' group had 44 patients (27 Male, 17 female, mean age 40 years (range 17–76 years).

There was an association noticed between the older groups and steroid defaulting, and the possibility of defaulting seemed to increase (>45 years) with the age of the patients. This was statistically significant ($P = 0.0346$) Table 1.

The analysis of the data also shows that there is no significant association between the level of education and the possibility of defaulting. Family history and type of leprosy also have no effect on the possibility of defaulting.

The results also show that around 55 (56.7%) patients from both groups felt some form of stigma was attached to attending hospital for their medication.

DISEASE PROFILE

Among the 97 patients in the sample, only one was paucibacillary and 96 (99%) were multibacillary patients, 45 (46.4%) patients had no disability, according to the WHO disability grade, 19 (19.6%) had Grade 1 and, 33 (34%) had Grade 2. Forty-five (46.4%) patients had neuritis, 37 (38.1%) had only Type 1 reaction and seven (7.2%), six (6.2%) two (2.1%) were as Type 1 reaction with + Neuritis, Type 2 reaction, and Type 2 reaction with neuritis respectively.

Patients who had a history of defaulting from MDT therapy (26.4%), had a significantly higher association ($P = 0.001$) with defaulting from steroid therapy than those who completed their MDT (2.3%) within the scheduled time.

Table 1. Details of demographic, disease profile and steroid card, steroid leaflet, stigma, SALSA and P scale and its association with defaulting steroid therapy

	Completed (n = 44)		Defaulted (n = 53)		Total (n = 97) n (%)	P-value
	n = 44	(%)	n = 53	(%)		
Gender						
Female	17	(38.60)	16	(30.20%)	33 (34.00%)	0.4133
Male	27	(61.40)	37	(69.80%)	64 (66.00%)	
Age Group						
< 15 years	5	(11.40)	0	(0.00%)	5 (5.20%)	0.0346
15–25 years	10	(22.70)	11	(20.80%)	21 (21.60%)	
26–45 years	23	(52.30)	24	(45.30%)	47 (48.50%)	
46–60 years	4	(9.10)	13	(24.50%)	17 (17.50%)	
> 60 years	2	(4.50)	5	(9.40%)	7 (7.20%)	
Education						
Illiterate	17	(38.60)	24	(45.30%)	41 (42.30%)	0.3648
Primary (1–5)	6	(13.60)	12	(22.60%)	18 (18.60%)	
Secondary (6–10)	17	(38.60)	15	(28.30%)	32 (33.00%)	
> 10	4	(9.10)	2	(3.80%)	6 (6.20%)	
Family History of Leprosy						
Yes	12	(27.30)	18	(34.00%)	30 (30.90%)	0.5036
No	32	(72.7)	35	(66%)	67 (69.1%)	
Leprosy Type						
MB	43	(97.70)	53	(100.00%)	96 (99.00%)	0.2699
PB	1	(2.30)	0	(0.00%)	1 (1.00%)	
WHO Grade						
0	22	(50.00)	23	(43.40%)	45 (46.40%)	0.8097
1	8	(18.20)	11	(20.80%)	19 (19.60%)	
2	14	(31.80)	19	(35.80%)	33 (34.00%)	
Leprosy Complication						
NEURITIS	17	(38.60)	28	(52.80%)	45 (46.40%)	
T1R	18	(40.90)	19	(35.80%)	37 (38.10%)	
T1R + Neuritis	5	(11.40)	2	(3.80%)	7 (7.20%)	
T2R	2	(4.50)	4	(7.50%)	6 (6.20%)	
T2R + Neuritis	2	(4.50)	0	(0.00%)	2 (2.10%)	
MDT Default						
Yes	1	(2.30)	14	(26.40%)	15 (15.50%)	0.0010
No	43	(97.70)	39	(73.60%)	82 (84.50%)	
Steroid Card						
No	5	(11.40)	17	(32.10%)	22 (22.70%)	0.0153
Yes	39	(88.60)	36	(67.90%)	75 (77.30%)	
Steroid Leaflet						
Yes	34	77.30	44	83%	78 (80.40%)	0.4777
No	10	22.70	9	17%	19 (19.60%)	
Stigma						
Yes	25	(56.8%)	30	(56.60%)	55 (56.70%)	0.9831
No	19	(43.20%)	23	(43.4%)	42 (43.30%)	
P scale						
0–12	44	(100%)	52	(98.11%)	96 (98.97%)	1.00
13–22	0	(0.00%)	1	(1.89%)	1 (1.03%)	
SALSA						
10–24	40	(90.90%)	46	(86.79%)	86 (88.66%)	0.4254
25–39	4	(9.10%)	5	(9.43%)	9 (9.28%)	
40 to 49	0	0 (0.00%)	2	(3.77%)	2 (2.06%)	

IMPACT OF STEROID CARD

Among the patients who defaulted 67.9% received a steroid card compared to 88.6 % ($P = 0.015$) among the completed patients; this suggests that the provision of a steroid card with appropriate training has a statistically significant effect on completing steroid treatment.

FACTORS THAT AFFECT ADHERENCE

Table 2 shows some of the reasons for defaulting from steroid therapy given by patients who defaulted, in comparison with those who completed steroid therapy.

Table 1 is based on five dimensions of adherence (WHO 2003).²⁰ The reasons for defaulting are classified as social, economical, patient, condition and health care system related factors.

Under the defaulter's group, 11.30% stopped steroid therapy due to misguidance by family members, neighbours and field health workers in the village, and the same number, 11.30% defaulted because there was no person to accompany them to hospital. This group included female and aged patients; 18.9% of patients were unaware that they should complete the full course of steroid therapy. Similarly, 26.4% patients had stopped taking their steroids due to an improvement in their signs and symptoms, and 7.5% patients stopped due to lack of improvement in their condition. Some 13.2% among 'defaulters' were patients who had migrated away from home for reasons of work. Furthermore, both completed and defaulted groups experienced the economic burden of travel (86.8% defaulter and 88.6% completed) and loss of wages during hospital visits (81.1% defaulter and 86.4% completed).

KNOWLEDGE ON REACTION AND NEURITIS, AND STEROID THERAPY

Knowledge about reactions and neuritis, steroid therapy and its importance was very low in both groups (Table 3).

Based on our open-ended questionnaire, knowledge about reactions and neuritis were found to be 52.27% ($n = 23$) among completed and 50.94% ($n = 27$) among defaulted patients.

ADVERSE EVENTS DURING STEROID THERAPY

Adverse events experienced by the study sample were also analysed. The most common adverse events were arcane, frequency of micturition and nocturia, infections (gastrointestinal and respiratory), weight gain and edema. The difference in the frequency of the adverse events between the two groups was not statistically significant ($P > 0.05$) (Table 4).

In the defaulters group, three (10.7%) patients suffered pain, cough, and loose stools, eight (28.6%) generalised body swelling and seven (25%) had a fever. In contrast with the defaulter group, in the completed group, eight (38.1%) had acne, two (9.5%) had gained body weight, one (4.76%) had difficulty with vision and two (9.5%) had dental problems.

Discussion

This study was aimed to assess the risk factors for defaulting from oral steroid therapy in leprosy patients with reactions and neuritis. While India declared leprosy eliminated as a

Table 2. Factors that affect the adherence

		Completed					Defaulters					
		VNS					VNS					
Frequency	%	Mean	Median	Mode	S.D	Reasons	Frequency	%	Mean	Median	Mode	S.D
						Social related Factor						
1	2.30%	6				Misguidance	6	11.30%	9	9	10	1
3	6.80%	6	6			No one there to bring hospital	6	11.30%	8.2	9	10	2.4
1	2.30%	4				Lack of family Support	2	3.80%	3	3		
						Stigma	1	1.90%	8			
39	88.60%	5	6	6	2	Economical related factor	46	86.80%	5.9	6	6	1.7
38	86.40%	7.5	8	9	2.3	Lack of Money	43	81.10%	8.6	9	10	2.2
						Loss of Wages	7	13.20%	8.75	8.5	8	0.96
						Due to work-Travel / Job	5	9.40%	6.4	6	6	1.7
						Lack of transport	2	3.80%	6.5			
						Long Distance						
1	2.30%					Fear of Losing Job						
						Patient related Factor						
						Lack of awareness	10	18.90%	9.2	10	10	1.1
						Mental Illness	1	1.90%	6			
						Negligence	2	3.80%	9	9		1.4
						Fear of Admission	2	3.80%	8			
						Jailed	1	1.90%	10			
						Physical Inability						
1	2.30%					Condition Related Factor						
						Improvement	14	26.40%	8.2	8	8	0.83
						No Improvement	4	7.50%	6.5			
						Complication	2	3.80%				
						Health care & system related factor						
						Getting Steroids from PHC / Private	3	5.70%				

Table 3. Patient’s awareness on meaning of reaction and neuritis and knowledge on importance of steroid therapy

	Completed				Defaulters			
	Meaning (n = 23)		Importance (n = 13)		Meaning (n = 27)		Importance (n = 10)	
	n	%	n	%	n	%	n	%
Blister	0	0.0%			2	7.4%		
Deformity	4	17.4%	4	30.8%		7.4%	4	40.0%
Increased patch	3	13.0%			4	14.8%		
Nodules	1	4.3%	1	7.7%	7	25.9%	0	0.0%
Pain	6	26.1%	3	23.1%	8	29.6%	5	50.0%
Red/Raised patch	7	30.4%	11	84.6%	6	22.2%	5	50.0%
Swelling	2	8.7%			1	3.7%		
Tingling	5	21.7%			4	14.8%		
Weakness	5	21.7%	1	7.7%	9	33.3%	6	60.0%
Disease			1	7.7%			3	30.0%
Fever			0	0.0%			2	20.0%
Headache			0	0.0%			1	10.0%
Itching			0	0.0%			1	10.0%

public health problem and integrated into the general health care system in 2005,¹⁴ leprosy still has significant healthcare issues and shares 58.1% of the global leprosy disease burden.^{9,10} The challenge in leprosy is early detection and treatment of neuritis with steroid therapy to prevent Grade 1 and Grade 2 deformities. Previous epidemiological studies have reported that nerve function impairment at the time of registration ranged from 15%¹⁷ to 55%.¹⁸ The INFIR study reported 38% of patients presented with nerve function impairment (NFI) at

Table 4. Adverse events during steroid therapy

	Completed* n = 21		Defaulted n = 28		Total
	n	%	n	%	
Acne	8	38.1%	0	0.0%	8
Abdominal pain	1	4.8%	2	7.1%	3
Nocturia	3	14.3%	1	3.6%	4
Pain	0	0.0%	3	10.7%	3
Cough	2	9.5%	3	10.7%	5
Fever	5	23.8%	7	25.0%	12
Loose stools	2	9.5%	3	10.7%	5
Sensory loss	1	4.8%	1	3.6%	2
Weakness	3	14.3%	1	3.6%	4
Frequency of micturition	9	42.9%	12	42.9%	21
Swelling legs / body	3	14.3%	8	28.6%	11
Weight gain	2	9.5%	0	0.00%	2
Difficulty in vision	1	4.8%	0	0.00%	1
Dental Problems	2	9.5%	0	0.00%	2
Ulcer	0	0.0%	1	3.6%	1

* P values > 0.05.

the time of registration, out of which 21% had sensory and motor impairment of recent onset treated with steroids.

Steroids has been the primary drug of choice for the treatment of neuritis for many decades, though there are a few other drugs like azathioprine, which is probably effective in preventing further nerve damage, but fails to achieve recovery of nerve function and requires further controlled studies.¹⁹ The effectiveness of long-term therapy depends primarily on good adherence, and is the prime determinant of therapy efficacy,^{20,21} Poor adherence not only jeopardizes the optimal clinical benefits, but also affects the health and lifestyle of an individual.^{22,23} Further, it also affects the secondary prevention of the disease and the impact of effective interventions.

Adherence can be defined as ‘the extent to which a person’s behaviour – taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider’.²⁴ Unfortunately, due to a number of psychosocial, economic, medical and health service factors, a significant number of patients become irregular and default from steroids. Non-adherence results in compromised outcome and excess health care cost.²⁵ According to the WHO, there are five interacting factors as evidence for action to improve patient’s adherence to long-term therapies. These include social and economic factors, health care and system-related factors, condition-related factors, therapy-related factors and patient-related factors.²⁶

RELATED SOCIAL FACTORS

In treating or eradicating any social disease like leprosy, it is imperative to educate community members about the disease, treatment availability and the consequences in personal, family and society levels if health care services are not sought.¹⁴ The current study shows that family support is crucial for patients to complete their treatment, especially children, women and the aged. The study demonstrated that 11% of defaulted patients did not have anyone to accompany or take them to the hospital; most of these were women and aged patients. Patients also felt some form of stigma in attending hospital for medication in both groups (57%).

ECONOMICAL-RELATED FACTOR

Leprosy has a strong association with poverty.²⁷ The current study showed a significant loss of wages, and most patients experienced financial constraints during the course of therapy in both completed and defaulted groups due to the necessity of frequent hospital visits. Patients with leprosy complications had experienced disastrous health care expenditure of more than 40% of the total family income.²⁸ In addition, it is sensible to note that patients defaulted steroid therapy because of migration to other states and districts, thereby incurring financial losses on frequent travel. Therefore, these factors should be discussed in detail with the patient at the time of diagnosis and treatment for reaction and neuritis through counseling. Healthcare professionals, including social workers should be aware of the economic burden of leprosy and its complications, and provide appropriate assistance to patients, including government economic support aids.²⁴

PATIENT-RELATED FACTORS

It is reasonable to assume that patients' knowledge about the disease, complications, medication and its side effects will influence their adherence in any long-term therapy.^{29,30} However, there was no significant difference in the patients' knowledge on reactions, neuritis and steroid therapy, and its importance between the completed and defaulted groups.

TREATMENT OUTCOME FACTORS

Improvement or lack of improvement in a patient's condition after medication significantly affects their adherence to treatment. If the patient has not been educated sufficiently, they tend to default from treatment; if they feel better, they think there is no need for more medicine, and if they are worse, they feel the medicine is not working. Therefore, patients' knowledge of the effect of steroids is the primary factor, which was lacking in both patient groups; hence, focused health care training is essential.

HEALTH CARE AND SYSTEM-RELATED FACTORS

Many healthcare delivery system models recommend improving patient adherence in chronic diseases, by including them as a co-producer of their health and incorporating them as a key participant in the health care services.^{26,31} Improved relationships between healthcare providers and patients may improve the adherence. Every newly diagnosed leprosy patient has to undergo a battery of procedures at different departments. These start from the initial screening by a paramedical worker, laboratory investigations, and detailed nerve function assessments in the physiotherapy department and final consultations with medical officers. In addition, the patient is educated about the disease, possible complications during the course of treatment and self-care as appropriate. If a patient is diagnosed with a reaction and/or neuritis, they are advised to be admitted to the hospital to make sure that they fully understand the outcome of oral steroid therapy. However, the results show that these efforts are not sufficient and need to be strengthened or done in a more focused manner.

OTHER FACTORS

Surprisingly, it was noted that patients who did not receive the steroid card were more likely to default. Each patient treated with oral steroid therapy was issued with a steroid card and advised about the importance and possible complications of steroid therapy, and of showing the card to any doctor if they needed consultation for any other illness during steroid therapy. Therefore, the steroid card created a positive effect on patients to complete the steroid therapy regime. In addition, only 1.89% patients had a participation restriction in the steroid-completed group measured on the *P* scale. Both defaulted (9.43%) and completed (9.10%), groups had experienced mild activity limitation measured, and 3.77 % of moderate activity limitation among the steroid defaulted group. There was no statistical significance in the *P*-scale ($P = 1.000$) and SALSA ($P = 0.4254$) between the steroid completed and defaulted groups.

Conclusion

This study presented multifactorial risk factors for non-adherence in taking steroid therapy for leprosy related complications. This study also assessed the impact of knowledge of disease and treatments, and their association in non-adherence. Despite the various efforts aimed at improving compliance by means of proper counseling about the disease and its treatments, non-adherence to steroid therapy is common. Therefore, concrete efforts should be made by bearing in mind possible risk factors during patient education and counseling. In addition, family members should be included during counseling before oral steroid therapy is started. Furthermore, there is a need for operational research to establish effective methods and means in creating awareness of patients' health conditions and treatment in rural settings and the impact of adequate health education and counseling at the time steroid therapy commences.

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Contribution of each author

- Mr. Suresh Mani was involved in study conceptualization and design, preparing the semi structural questionnaires, analysis and interpretation of data and preparation of the manuscript.
- Mr. Pitchaimani contributed in data compilation and table preparation.
- Dr. Joydeeba Darlong was involved in designing the questionnaire and manuscript writing.
- Dr. Annamma S. John contributed in finalising the semi-structured questionnaires, getting approval and ethical clearance. She also contributed to writing and editing the final manuscript.

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