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Evaluate The Effectiveness Of Nurse Initiated M-Health Intervention On Perceived Burden, Coping Ability Among Primary Caregivers Of Non-Ambulatory Spinal Cord Injury Patients At Selected Rehabilitation Centre, Coimbatore

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Abstract

Caregivers of Non-Ambulatory Spinal Cord Injury (NASCI) patients experience considerable physical and emotional burden, which affects their coping ability. Nurse-initiated M-Health interventions offer an innovative and accessible approach to provide continuous education, counselling, and support, thereby reducing burden and enhancing coping. The objective was to evaluate the effectiveness of a nurse-initiated M-Health intervention on perceived burden and coping ability of primary caregivers of non-ambulatory SCI patients. A pre-experimental one-group pre-test post-test design was adopted. Sixty primary caregivers were selected through purposive sampling at Ganga Rehabilitation Centre, Coimbatore. Tools included a demographic proforma, Zarit Burden Interview (ZBI), and Coping Orientation to Problems Experienced (COPE) scale. The intervention consisted of a four-week nurse-initiated M-Health program delivered via What Sapp, Mobile phone without internet connection including education, reminders, and motivational support. Data were analyzed using descriptive and inferential statistics. The intervention significantly reduced caregiver burden and enhanced coping ability ($p < 0.001$). A strong negative correlation was observed between burden and coping ($r = -0.600$). Nurse-initiated M-Health interventions are effective, feasible, and scalable strategies to reduce caregiver burden and strengthen coping among caregivers of non-ambulatory SCI patients in India.

Keywords: Spinal cord injury, caregiver burden, coping, nurse-initiated intervention, M-Health.

Introduction

Spinal Cord Injury is a life-altering condition that often leads to permanent changes in strength, sensation, and other body functions below the site of the injury. Non-Ambulatory Spinal Cord Injury patients, in particular, require long- term assistance with daily activities, which places a significant and sustained burden on their caregivers. [1] These caregivers, often family members, assume multiple roles and responsibilities including physical care, emotional support, financial management, and healthcare coordination. Over time, the cumulative demands of caregiving can lead to physical exhaustion, emotional distress, financial strain, and social isolation collectively contributing to what is referred to as caregiver burden. [2]

Coping ability, or the capacity to manage stress and challenges effectively, plays a critical role in determining how caregivers adapt to and manage their caregiving responsibilities. [3] Inadequate coping can lead to burnout, depression, and decreased quality of care provided to the patient. It is therefore essential to implement interventions that support caregivers by not only reducing their burden but also strengthening their coping mechanisms. [4]

In recent years, M-Health has emerged as a promising tool in healthcare delivery. M-Health involves the use of mobile devices and digital technologies such as text messaging, mobile applications, voice calls, and online platforms to deliver health-related services and information. For caregivers, M-Health offers an accessible, cost-effective, and flexible means of support. It can provide educational materials, emotional encouragement, symptom monitoring, reminders, and real-time interaction with healthcare providers, particularly nurses. [5]

Nurses play a pivotal role in educating and supporting caregivers. When nurses initiate M-Health interventions, they combine clinical expertise with technological outreach to create structured, personalized, and continuous caregiver support. Such interventions can improve caregiver knowledge, reduce anxiety, promote positive coping strategies, and ultimately alleviate caregiver burden. [6][7]

Background of the study

Spinal cord injury is a debilitating condition with far-reaching physical, emotional, and socioeconomic consequences. According to the World Health Organization (WHO, 2023), between 250,000 to 500,000 new cases of SCI occur worldwide each year, primarily due to traumatic causes such as motor vehicle accidents, falls, and violence. A substantial number of these individuals remain non-ambulatory, depending on others for daily living activities, which places a significant burden on their caregivers.

Middleton et al. (2018) conducted a longitudinal Dutch study and reported that approximately 43–46% of partners of SCI patients experienced high caregiver burden, with strong links to mental health challenges and reduced life satisfaction. In developed nations such as the United States, Canada, Australia, and parts of Europe, informal caregivers often spouses or close family members play a critical role in managing the long-term care of SCI patients. Studies consistently report high levels of caregiver strain, which manifest as physical fatigue, emotional burnout, financial hardship, and social withdrawal. For example, **Middleton et al. (2021)** found that 70% of SCI caregivers in Australia reported moderate to high levels of caregiver burden, with significant associations to anxiety and depression. Similarly, **Piatt et al. (2022)** in the USA emphasized that caregivers of patients with chronic spinal cord conditions are at increased risk of stress-related health problems if left unsupported.

Despite awareness of these challenges, most health systems globally continue to focus primarily on patient rehabilitation, often neglecting the needs of caregivers. In response, there has been growing interest in digital health interventions, particularly M-Health, which leverage smartphones, mobile applications, SMS reminders, and virtual consultations to deliver healthcare remotely. M-Health is now recognized as a cost-effective and accessible way to provide psychosocial support, caregiver education, and continuous communication with healthcare teams. [9]

STATEMENT OF THE PROBLEM

Evaluate the effectiveness of Nurse Initiated M-Health Intervention on perceived burden, coping ability among primary caregivers of Non Ambulatory Spinal Cord Injury patients at Ganga rehabilitation centre, Coimbatore

OBJECTIVES OF THE STUDY

- To assess the pre and posttest level of perceived burden, coping ability among primary caregivers of Non Ambulatory Spinal Cord Injury patient.

- To evaluate the effectiveness of Nurse Initiated M-Health Intervention on perceived burden, coping ability among primary caregivers of Non Ambulatory Spinal Cord Injury patient.

- To determine the correlation between perceived burden, coping ability among primary caregivers of Non Ambulatory Spinal Cord Injury patient.

- To associate the selected demographic variables with the mean differed level of perceived burden and coping ability among primary caregivers of Non Ambulatory Spinal Cord Injury patient.

HYPOTHESES

✓ **H1**: There will be a significant difference between pre and posttest score of perceived burden and coping ability among primary caregivers of Non Ambulatory Spinal Cord Injury patient.

✓ **H2:** There will be a significant effectiveness of Nurse Initiated M- Health Intervention on perceived burden and coping ability among primary caregivers of Non Ambulatory Spinal Cord Injury patient.

✓ **H3**: There will be a correlation between the mean differed level of perceived burden and coping ability among primary caregivers of Non Ambulatory Spinal Cord Injury patient.

✓ **H4**: There will be a significant association between the selected demographic variables with mean differed level of perceived burden and coping ability among primary caregivers of Non Ambulatory Spinal Cord Injury patient.

REVIEW OF LITERATURE

- **Section I:** Empirical Scientific Studies on the M-Health intervention on primary care givers

- **Section II:** Empirical Scientific Studies on the perceived burden on primary caregiver

- **Section III:** Empirical Scientific Studies on coping ability of primary caregiver

- **Section IV:** Empirical scientific studies on non-ambulatory spinal cord injury patient

RESEARCH METHODOLOGY

RESEARCH APPROACH

Quantitative research approach was used.

RESEARCH DESIGN

A pre experimental one group pre posttest research design was adopted for the present study.

VARIABLES

Independent variables

The independent variable in the study is Nurse Initiated M-Health Intervention.

Dependent variables

The dependent variables in the study are Caregivers Perceived burden and Coping ability of NASCI patients.

SETTING OF THE STUDY

The study was conducted at **Ganga Rehabilitation Center, Coimbatore**, It was 36 bedded a tertiary care facility for spinal cord injury patients. The center was chosen for its large number of non-ambulatory patients, availability of physiotherapy, occupational therapy, nursing care, and trained professionals, providing a suitable environment for implementing nurse-initiated M-Health interventions.

POPULATION

In this study, the target population comprises primary Caregivers of NASCI patients with aged above 18 years above among Ganga rehabilitation Centre, Coimbatore.

SAMPLE

In this study, the sample comprises of 60 primary caregivers of NASCI patient considered for quantitative sampling method in Ganga Rehabilitation center, Coimbatore.

SAMPLE SIZE

The sample size for study comprised of 60 sample was consider for quantitative sampling in Ganga Rehabilitation centre, Coimbatore.

SAMPLING TECHNIQUE

Participants of the study are selected by non-probability purposive sampling technique.

CRITERIA FOR SAMPLE SELECTION

Inclusion criteria Caregivers who were

- Primary caregivers for non-ambulatory SCI patients
- In the age group of 18 years above

- Access to a phone, tablet, or computer with internet connectivity and familiar to use the technology
- Ability to understand and communicate in the language (English, Tamil) of the M- Health intervention
- Ensured their willingness to provide informed consent to participate

Exclusion criteria Caregivers who were

- Without access to a smartphone
- Could not understand or communicate in the language (English, Tamil)
- Unwilling to provide informed consent to participate in the study.
- Had SCI patients who were not non-ambulatory or who do not require significant caregiving support.
- With severe cognitive impairments

DEVELOPMENT AND DESCRIPTION OF THE TOOL

The tool used in this study has 3 sections

Section-1

Demographic variables

It consisted of item for obtaining information about the demographic data such as age, gender, Relationship with patient, Level of education, Income level, Residential area, Caregiver live with patient, Hours of caregiving per day, Have formal training in caregiving, Caregiving experience, Usage of technology.

Section-2

Zarit Burden caregiver scale Scoring

S/n	Score	Interpretation
1	0-10	No to mild burden
2	11-20	Mild to moderate burden
3	>21	Mild to severe burden

Section-3

Coping orientation to problem experienced scale

s/n	Scoring	Interpretation
1	0-24	Poor
2	25-48	Fair
3	49-72	Good
4	73 -96	Excellent

Table: 3.2 coping orientation to problem experienced scoring tool

PROCEDURE OF DATA COLLECTION

Data collection was carried out at Ganga Rehabilitation Center, Coimbatore, Who are admitted in Ganga rehabilitation center in the month of January 2025. After obtaining institutional and administrative permission. The study was conducted for a total duration of four weeks. The purpose was explained to the participants, informed consent was obtained, and confidentiality was assured. A non-probability convenient sampling technique was used to select 60 primary caregivers of NASCI patients. On day one, the demographic proforma, Zarit Burden Caregiver Scale, and Coping Ability Scale were administered for pre-test assessment. The investigator then implemented a Nurse-Initiated M-Health Intervention through WhatsApp for four weeks, which included daily reminder messages on medication, exercise, yoga, bowel and bladder care, skin management, and motivational quotes and stories. After the 4- week intervention, a post-test using the same tools was conducted. Data were checked daily for accuracy and compiled for statistical analysis

Data collection is the gathering of population needed to address a research problem. Data was collected from the primary caregivers of NASCI patient. At first a report was established with the primary caregivers of NASCI patient, and purpose of the study was explained them. It was assured to them that all data would be kept strictly confidential and will be used only for the study purpose.

After obtaining the verbal and written consent of the primary caregivers of NASCI patient to participate the study, demographic data were collected by investigator. The intervention was carried out by the investigator in experimental group I, the investigator provide M-Health intervention one group. The intervention provide at 7am to 7pm.

Data analysis and interpretation

Data was analyzed by both descriptive and inferential statistics such as mean, standard deviation, paired T test, Karl Pearson’s Correlation, One Way ANOVA.

Demographic data signified that Above the table shows that the demographic profile of the primary caregivers of Non-Ambulatory Spinal Cord Injury (NASCI) patients (N = 60) reveals that the majority were middle-aged, with 43.3% aged between 36–45 years and 31.7% between 46–55 years. Females represented a higher proportion (68.3%) compared to males (31.7%), and most caregivers were spouses of the patients (65%), followed by parents (20%). Regarding education, 35% had secondary education and 25% had primary education, while only a small portion had higher education qualifications. In terms of employment, 41.7% were employed full-time, 20% part-time, and 33.3% were unemployed. Income levels were predominantly low, with 66.7% earning below 2,000. A majority (70%) resided in rural areas, and 95% lived with the patient, indicating a high level of direct involvement in caregiving. Most caregivers (50%) spent 7–10 hours daily in caregiving, and 78.3% provided more than 7 hours per day. Notably, 75% had no prior caregiving experience, though 90% had received formal training. In terms of technology use, 43.3% used it frequently, 33.4% occasionally, and 23.3% rarely. Overall, the data suggest that caregivers are primarily middle-aged rural women, with moderate education and economic challenges, who are highly involved in intensive caregiving with some level of formal training and technological access.

Table 1: Frequency and percentage distribution of level of coping among the caregivers of Non-Ambulatory Spinal Cord Injury patients. n= 60

Coping	Pretest		Posttest	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Poor (0 – 24)	42	70.0	-	-
Fair (25 – 48)	18	30.0	-	-
Good (49 – 72)	-	-	60	100.0
Excellent (73 – 96)	-	-	-	-

Table 2: Comparison of pretest and posttest perceived burden scores among the caregivers of Non-Ambulatory Spinal Cord Injury patients. n= 60

Perceived Burden	Median	Mean	S.D	Mean Difference	Paired ‘t’ test & p- value
Pretest	42.0	41.42	3.48	**38.72**	**t =77.208 p=0.0001** **S*****
Posttest	2.0	2.70	1.75		

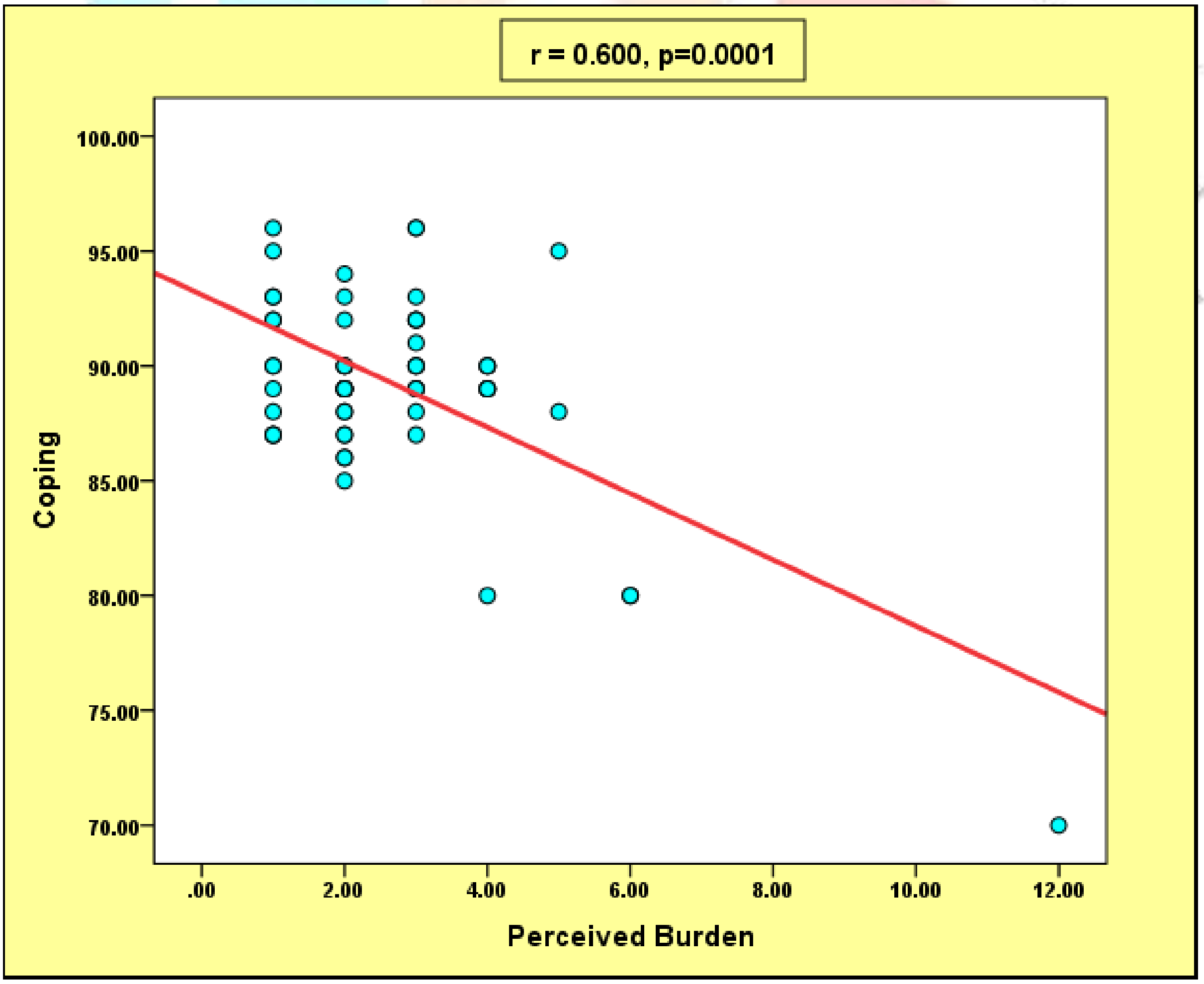
***p<0.001, S – Significant

Table 3: Comparison of pretest and posttest coping scores among the caregivers of Non-Ambulatory Spinal Cord Injury patients. n= 60

Coping	**Median**	**Mean**	**S.D**	**Mean Difference**	**Paired 't' test & p-Value**
Pretest	23.0	22.87	4.99	**65.86**	**t =84.458 p=0.0001 S*****
Posttest	89.0	89.73	3.18		

***p<0.001, S – Significant

Figure 1: Scatter diagram showing the correlation between posttest perceived burden and coping among the caregivers of Non-Ambulatory Spinal Cord Injury patients



The fourth objectives signified the association between the mean difference in perceived burden scores of caregivers and their selected demographic variables. The analysis revealed that gender was the only demographic factor significantly associated with the mean difference in perceived burden scores (t = 3.786, p

= 0.001), with female caregivers showing a greater reduction in burden compared to males. No statistically significant associations were found with other demographic variables, including age (F = 0.328, p = 0.858), relationship with patient (F = 0.402, p = 0.752), level of education (F = 1.194, p = 0.324), employment status (F = 1.197, p = 0.322), income level (F = 1.660, p = 0.173), residential area (t = 0.125, p = 0.902), living with patient (t = 0.328, p = 0.773), hours of caregiving per day (F = 0.177, p = 0.949), caregiving experience (t = 0.018, p = 0.986), formal training in caregiving (t = 0.706, p = 0.506), and usage of technology (F = 1.574, p = 0.216). These findings indicate that while most demographic variables did not significantly influence the reduction in perceived burden, gender played a crucial role, with female caregivers experiencing greater benefit from the nurse-initiated M-Health intervention.

The association between the mean difference in coping scores of caregivers and their selected demographic variables revealed the following results. The results indicate that a statistically significant association was found between coping score differences and the variables **relationship with patient** (F = 2.957, p = 0.040) and **income level** (F = 2.768, p = 0.036). Caregivers who were spouses and those with a monthly income of 1,000–2,000 showed higher improvement in coping ability compared to other groups. Conversely, no significant association was observed with age (F = 0.565, p = 0.689), gender (t = 1.714, p = 0.096), level of education (F = 0.502, p = 0.773), employment status (F = 1.066, p = 0.382), residential area (t = 0.574, p = 0.570), living with patient (t = 1.284, p = 0.325), hours of caregiving per day (F = 0.521, p = 0.720), caregiving experience (t =0 .292, p = 0.773), formal training in caregiving (t = 0.540, p = 0.609), and usage of technology (F = 1.253, p = 0.293). Overall, these findings reveal that **relationship with the patient and income level** significantly influenced improvement in coping scores after the nurse-initiated M-Health intervention, while other demographic variables did not show a statistically significant association (p > 0.05).

CONCLUSION

The findings of the study clearly indicated that **Nurse-Initiated M-Health Intervention** was effective in improving coping ability and reducing perceived burden among caregivers of NASCI patients. The structured support delivered through mobile- based communication enhanced caregivers’ emotional resilience, provided timely guidance, and empowered them to handle caregiving responsibilities with greater confidence. The significant inverse relationship between burden and coping further highlights the importance of such interventions in caregiver support.

RECOMMENDATIONS

- M-Health support programs should be made a standard part of caregiver services in rehabilitation centres.

- More extensive studies with larger and diverse populations are recommended to enhance generalizability.

- Develop caregiver-specific mobile applications that offer daily tips, motivational content, and emotional support.

- Encourage collaboration between nurses, psychologists, and IT professionals to build tech-enabled care ecosystems.

- Include long-term follow-up assessments to examine the sustained impact of M- Health intervention

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