Exploring the Impact of Chemotherapy-Induced Peripheral Neuropathy on Sleep Quality of Cancer Survivors

Fawaz Mayez Mahfouz, BAdvSc(Hons)[1], Tiffany Li, MBiostat[1], Michelle Harrison, MBBS[2], David Goldstein, MBBS[3,4], Susanna B. Park, PhD[1]

[1]Brain and Mind Centre, The University of Sydney, Australia, [2]Chris O'Brien Lifehouse, [3]Prince of Wales Clinical School, UNSW Medicine, UNSW Sydney, Australia, [4]Department of Medical Oncology, Prince of Wales Hospital, Sydney, Australia.

THE UNIVERSITY OF SYDNEY

Introduction & Aims

- Sleep problems are commonly reported by cancer survivors.
- Knowledge of the impact of chemotherapy-induced peripheral neuropathy (CIPN) on sleep quality remains limited.
- Aim: to investigate the prevalence of sleep dysfunction in neurotoxic chemotherapy-treated patients and explore the impact of CIPN on sleep quality, as well as identifying clinical characteristics of CIPN associated with poor sleep quality.

Methods

- Participants were assessed cross-sectionally post-treatment with neurotoxic chemotherapy
- Sleep quality was assessed using a self-rated questionnaire (Pittsburgh Sleep Quality Index, PSQI) with a cut-of of ≥ 5 out of 21 identifying participants with poor sleep quality. CIPN severity was graded using patient-reported outcome measure (EORTC-QLQ-CIPN20), a health-related quality-of-life outcome measure, CAP-PRI), a clinically-graded scale (NCI-CTCAE) and a neurological examination score (Total Neuropathy Score-clinical version; TNSc© John Hopkins University).
- Responses of '*not at all*' or '*a little bit/ a lot*' on the item '*do you have trouble sleeping due to neuropathy*' of the CAP-PRI was used to further classify participants with poor sleep quality into groups of *'sleep impairment due to other factors'* and *'CIPN-induced sleep impairment'*, respectively.
- Group comparisons were investigated using Mann-Whitney U tests or independent sample t-tests.

Results

- 77 participants (mean age=63.4±11.3) who were 13.0 (IQR=21.0) months post-neurotoxic chemotherapy treatment (predominantly taxanes, platinum agents or bortezomib) reported CIPN (NCI-CTCAE Grade≥1).
- Of those, 25% (n=19) reported having good sleep quality, while 75% (n=58) reported having poor sleep quality.
- Within the group of participants who reported poor sleep quality, 41% (n=24) reported CIPN-induced sleep impairments, while 59% (n=34) had sleep impairments due to other factors.
- Participants who had CIPN-induced sleep impairments had worse CIPN severity, including the patient-reported outcome measure (EORTC-QLQ-CIPN20), the clinically-graded scale (NCI-CTCAE) and the neurological examination score (TNSc) (all p<0.05) (Table 1).

Participants with Poor Sleep Quality (n=58)	Sleep Impairment due to other factors (n=34)		CIPN-induced Sleep Impairment (n=24)		P-value
	Median	IQR	Median	IQR	
Demographic characteristics					
Age (years), mean (SD) *	61.0	12.2	62.8	8.4	0.5
BMI (kg/m^2), mean (SD)*	26.1	5.3	27.1	6.1	0.6
Months since treatment completion	13.0	20.0	9.0	16.0	0.2
CIPN outcome measures					
TNSc	**3.0**	**4.0**	**5.0**	**3.0**	**0.01**
EORTC-QLQ-CIPN20	**10.5**	**10.9**	**22.8**	**11.4**	**<0.001**
CAP-PRI	**1.0**	**4.0**	**6.0**	**6.0**	**<0.001**
NCI-CTCAE score	**1.0**	**1.0**	**2.0**	**0**	**0.001**

Table 1. *Comparison of sleep outcome measures between participants with trouble sleeping due to CIPN or due to other factors, using Mann-Whitney U tests. p-value<0.05 was considered significant. *Indicates the use of independent sample t-tests. Higher scores indicate worse impairment of CIPN.*

- CIPN-induced sleep impairments were linked to worse physical functioning (Fig. 1A), worse social functioning (Fig. 1B), worse emotional well-being (Fig. 1C), and greater pain severity (Fig. 1D)

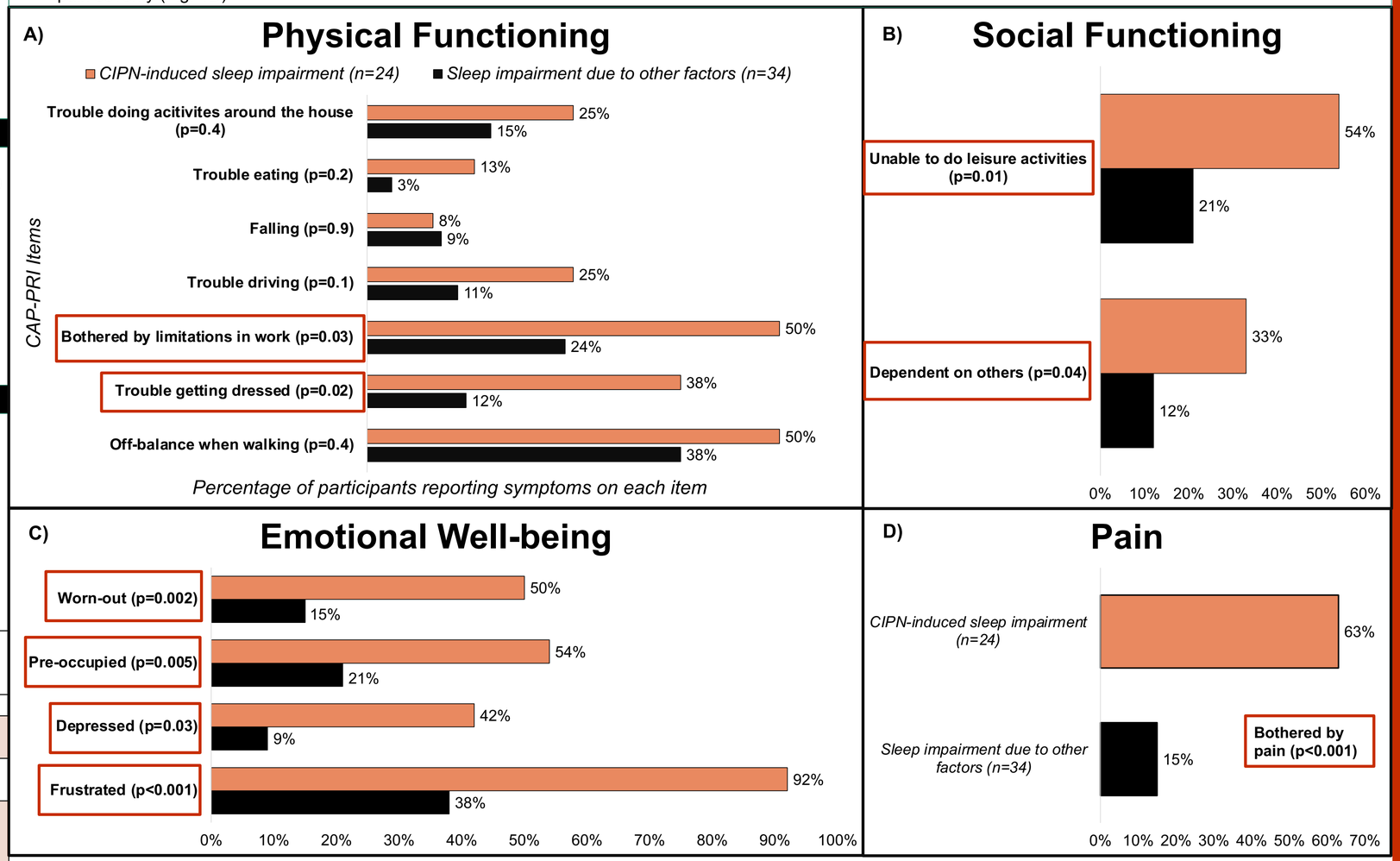

Figure 1. *Percentage of participants with trouble sleeping due to CIPN or other factors reporting at least "a little bit" or "a lot" on items of the health-related quality-of-life outcome measure (CAP-PRI). p-value <0.05 indicates significance. The solid rectangles indicate the items that were statistically significant.*

Discussion & Conclusions

- There is a high burden of sleep dysfunction in neurotoxic chemotherapy-treated cancer survivors.
- Patients reporting an impact of CIPN on their sleep have higher overall CIPN severity, including greater neuropathic pain.
- CIPN-induced sleep impairments affect the quality of life of cancer survivors, including their physical and social functioning, as well as their emotional well-being.
- Understanding patient burden may allow for individual intervention strategies and ultimately help lessen the impact of chronic CIPN on patient function and improve their quality of life.