A psychometric study of validation and cross-cultural adaptation of the Holden Communication Scale for elderly with dementia in care homes

Abdullah Alkhawaldeh, Asem Abdalrahim, Mohammad Saleh, Ahmad Ayed, Anas Nawwaf Abed Alrohman Ababneh, Mohammad Rababa, Alaa Dalky, Rasmieh Al-Amer, Sami Al-Rawashdeh, Omar Al Omari, Mohammed ALBashtawy, Islam Oweidat, Haitham Khatatbeh and Zaid ALBashtawy

Abstract

Purpose – *This paper aims to validate and adapt the Arabic version of Holden Communication Scale (HCS) for assessing communication skills among old people with dementia in care home.*

Design/methodology/approach – *A study involving 210 elderly residents from Jordanian care homes was conducted, where they completed the Arabic version of the HCS. Internal consistency and factor analysis techniques were precisely used to assess the scale's reliability. Additionally, cognitive function evaluation used the Arabic iteration of the Saint Louis University Mental Status (SLUMS) questionnaire, while communication skills were comprehensively appraised using the HCS.*

Findings – *The Arabic HCS has strong content validity, with a one-component structure accounting for 60% of the variation and a three-factor structure accounting for 77.2% of the variance. The original three-subgroup structure of the scale was recreated, and internal consistency varied from 0.85 to 0.87, indicating good reliability.*

Originality/value – *This study aimed to assess the reliability and validity of the Arabic version of the HCS among old people with dementia residing in care homes. The authors conducted examination of its psychometric properties within this unique population.*

Keywords *Old people, Validation, Psychometric, Cross-cultural, Dementia*

Paper type *Research paper*

AQ:2

(Information about the authors can be found at the end of this article.)

Introduction

Globally, dementia is a significant public health issue, as it ranks among the leading causes of impairment and dependency among older people [World Health Organization (WHO), 2021]. Dementia is a neurodegenerative disease that is characterized by memory loss, communication problems, mood changes, a low quality of life (QoL) and mental symptoms such as depression and anxiety (Abdalrahim *et al.*, 2022a, 2022b).

The prevalence of dementia is increasing, and it is projected that by 2050, nearly 152 million people worldwide will be living with dementia [World Health Organization (WHO), 2021]. Dementia significantly affects both those with the condition and their families. Moreover, it impacts daily functioning and social interactions and is often accompanied by stigma and discrimination [World Health Organization (WHO), 2021].

Funding: The authors received no financial support for the research authorship and/or publication of this article.

Conflicts of interest: No conflicts of interest for this article.

Communication difficulties pose a major challenge in caring for older people with dementia (PwD) (Banovic *et al.*, 2018). Speech and language problems in PwD are well-known to lead to communication difficulties. Depending on the cause of dementia, these deficits are thought to originate from language deficits rather than communication deficits. Older people with Alzheimer's dementia experience language deficits, evident in difficulties such as finding words, recalling names, and expressing concepts (Kempler and Goral, 2008; Strøm *et al.*, 2016). Moreover, cognitive deficiencies and language impairments are closely linked (Strøm *et al.*, 2016), and as dementia progresses, so does the decline in communication ability (Edvardsson *et al.*, 2008). However, cognitive decline does not diminish the fundamental human need for connection and companionship (Leary, 2021). Fulfilling this need for belonging is crucial for person-centered healthcare (Fazio *et al.*, 2018). Thus, understanding how to communicate with PwD who have moderate to severe cognitive impairments and communication deficits is essential.

Effective communication is vital for PwD to uphold their QoL (Banovic *et al.*, 2018). Unfortunately, communication difficulties in PwD are common (Abdalrahim *et al.*, 2022a, 2022b). Speech and language problems in PwD are recognized as factors contributing to communication difficulties (Banovic *et al.*, 2018). The Holden Communication Scale (HCS) is a frequently used instrument for measuring communication in PwD. It was developed by Strøm and colleagues in 2016 and has been widely employed in research to assess communication abilities in PwD. The original HCS consists of 12 items that gauge awareness, knowledge, conversation, and communication (Strøm *et al.*, 2016). Each HCS item is assessed on a Likert-type scale ranging from 0 to 4. The total score ranges from 0 to 48, with higher scores indicating greater communication difficulty. The original HCS demonstrated high validity and reliability, with a test-retest reliability of 0.71, Cronbach's alpha of 0.94, and adjusted item-total correlation ranging from 0.63 to 0.79 (Strøm *et al.*, 2016). The original version of the HCS questionnaire was in English. However, the psychometric properties of the HCS in old people with dementia have not been explored in Arabic-speaking populations. This study aims to investigate the psychometric properties of the translated Arabic HCS scale among old people with mild to moderate cognitive impairment residing in care homes in Jordan.

This psychometric study aims to validate and adapt the Arabic HCS scale across cultures.

Cross-cultural adaptation plays a pivotal role in ensuring the appropriateness and relevance of instruments originally developed in one cultural context for use in other cultures. Addressing this crucial aspect, the initial segment of this section is dedicated to summarizing the significance of cross-cultural adaptation in the context of our study. The remaining content, as suggested, will be seamlessly integrated into the procedure section to provide a comprehensive account of the undertaken cross-cultural adaptation process. In this study, we focus on the cross-cultural adaptation of the HCS to facilitate its utilization for assessing communication in PwD in Arabic-speaking countries. The process of cross-cultural adaptation accurately followed the comprehensive guidelines elucidated by Beaton *et al.* (2000), encompassing five distinct stages: initial translation, back-translation, synthesis, testing reliability and expert committee review.

For the initial translation, two nursing professors, proficient in both Arabic and English, conducted the rendering. The subsequent translation underwent synthesis and back-translation by an expert proficient in the English language. The ensuing step involved a meticulous review by an expert committee to ensure the integrity and accuracy of the translated content. Subsequently, the reliability of the adapted Arabic version of the HCS was evaluated through robust test-retest reliability and internal consistency analyses, with minor typographical adjustments made before the commencement of field testing.

By adopting Beaton *et al.*'s (2000) comprehensive framework, we emphasize the intrinsic value of cross-cultural adaptation in enhancing the applicability of instruments across

diverse cultural settings. The validated Arabic version of the HCS emerges as a powerful tool, poised to effectively assess communication in PwD within Arabic-speaking countries.

Methods

Study design

A descriptive cross-sectional study was undertaken, involving a sample of 210 old people residents from Jordanian care homes.

Participants

The selection criteria for participant inclusion were carefully described to ensure a cohort that met specific prerequisites. Eligible individuals were required to be residents of designated care homes and proficient in the Arabic language. Additionally, they were expected to have a minimum anticipated residency duration of one year or more at the designated care facility. In demonstrating their eligibility, participants needed to exhibit the capacity to comprehend study procedures and provide informed consent. Furthermore, they were required to fall within a specific range on the Mini-Mental State Examination (MMSE), with scores between 10 and 26, indicative of mild to moderate cognitive impairment.

To construct the participant cohort, a convenience sample comprising 210 Jordanian residents, aged 60 years and above, was methodically recruited from three distinct care homes during the period (February to May, 2023). In adherence to the specified criteria, prospective participants underwent a comprehensive evaluation process. Eligibility was confirmed through clinical diagnosis by a qualified psychiatrist within the selected care homes, ensuring a consistent diagnosis of any form of dementia. Potential participants were also assessed for their intention to reside within the designated care facility for a minimum duration of one year, their capacity to comprehensively understand the study's objectives and procedures, and their possession of an MMSE score within the designated range of 10 to 26, signifying mild to moderate cognitive impairment.

Old people with alternate psychiatric disorders, as determined by qualified psychiatrists, were excluded from the study, ensuring a cohort of participants aligned with the study's objectives and parameters.

Measures

Demographic data included age, location, dementia severity, gender, level of education and marital status. The Arabic version of the Saint Louis University Mental Status (SLUMS) was used to assess cognitive function in individuals with dementia (Abdelrahman & El Gaafary, 2014). The Arabic SLUMS, an 11-item questionnaire with scores ranging from 0 to 30, measures orientation, memory, attention and executive skills to identify cognitive impairment in older people. It has been shown to have a sensitivity of 94% and a specificity of 96% in identifying cognitive impairment (Abdelrahman & El Gaafary, 2014).

After translation and back translation to Arabic, HCS was used to measure communication (Strøm *et al.*, 2016). Arabic HCS consists of 12 items that test discourse, awareness and knowledge, and communication, and it can be completed in 2 to 5 min. The HCS was proven to be valid and dependable, with a test-retest reliability of 0.71 and Cronbach's alpha of 0.94 (Strøm *et al.*, 2016).

Procedure

Translation section

- Initial translation: Two nursing professors proficient in both Arabic and English conducted the initial translation of the HCS.

- Back-translation and synthesis: An expert translator skilled in English performed the back-translation of the translated HCS version, and the synthesized version was created.
- Expert Committee Review: An expert committee comprehensively reviewed and validated the translated content to ensure accuracy and cultural relevance.

Psychometric characteristics section

Reliability testing

- Test-Retest Reliability and Internal Consistency: To assess the reliability of the translated Arabic version of the HCS, we used test-retest reliability and internal consistency analyses.
- Test-Retest Reliability Assessment: Test-retest reliability was used to measure the consistency of participant responses over time.
- Internal Consistency Evaluation: Cronbach's alpha coefficient was used to assess the coherence of scale items.

Recruitment process

- Site Selection: Care homes served as the recruitment sites, and this process was facilitated by a skilled research assistant.
- Participant Information Dissemination: The research assistant disseminated comprehensive information to potential participants. This information encompassed study objectives, inclusion/exclusion criteria, benefits and contact details for the principal investigator.
- Informed Consent: Participants were asked to provide explicit consent for data usage within the study.

Before beginning the recruitment process, the researchers received ethics approval for the study from the Al al-Bayt University Research Ethics Committee. Throughout this process, the research assistant remained readily available to address queries, clarify doubts and efficiently collect completed consent forms from participants. These exactly performed steps in both the translation and psychometric characteristics sections underscore the precision and relevance of our study's methodology, which incorporates cross-cultural adaptation principles and empirical assessment.

Data analysis

The collected data were analyzed using the Statistical Package for Social Sciences (SPSS) version 25. Descriptive statistics (means, standard deviations and percentages) were used to summarize the demographic data of the participants. Additionally, Cronbach's alpha coefficient was used to test the questionnaire's internal consistency, with values ≥ 0.60 indicating satisfactory results (DeVon *et al.*, 2007).

Exploratory factor analysis (EFA) was conducted using a principle component extraction method to investigate the component structure and construct validity of the HCS. Prior to the EFA, Bartlett's sphericity test (with a significance level of <0.05) and the Kaiser–Meyer–Olkin (KMO) test (with a score >0.60) were carried out. Oblimin rotation was used to account for linked components. The number of components was determined by examining the scree plot and using the Kaiser criterion (eigenvalue 1). As the original HCS divide the scale into three subgroups, an EFA with three components was conducted.

Results

Descriptive

This study was conducted to collect demographic data from 210 Jordanian residents aged over 60 years from three care homes. Table 1 displays the participant's characteristics, revealing that the mean age of the residents was 66.4 (SD: 8.3) and the gender distribution was nearly equivalent (50.5% female). The study included participants with varying degrees of dementia severity (59% mild and 41% moderate), and the level of education was almost equal among the three care homes (52.5% less than high school education).

Face validity

A panel of four randomly selected older individuals participated in the face validity assessment of the Arabic–HCS survey instrument. Their task was to evaluate the congruence between the survey prompts and the study's intended objectives. Feedback from these experts revealed agreement that the instrument's prompts were well-defined, fitting, easily understandable and appropriately associated with the study's goals. Based on this agreement, it was confirmed that the instrument showed strong face validity.

Content validity

The content validity of the Arabic version of HCS was evaluated to ensure its comprehensive alignment with the research question and objectives. Following an initial review by the research team, the questionnaire underwent assessment by three independent nursing professors, using the Content Validity Index (CVI). These experts were instructed to rate each item as highly relevant, quite relevant, slightly relevant or not relevant. The final questionnaire was accurately refined based on the inputs from these assessors, retaining only items that received highly or quite relevant ratings.

Expert recommendations were incorporated, including maintaining the Likert scale and using imperative sentences for improved clarity among Arabic-speaking respondents. Notably, Lankford *et al.* (1981) suggest that when assessing a scale with fewer than five subject-matter experts (SMEs), the inclusion criterion should involve securing three relevant or extremely relevant ratings from at least three specialists. Items that do not meet this criterion should be excluded. A significant majority of the questionnaire prompts achieved

Table 1 Demographic characteristics of the participants

Characteristic	*Value*
Age (years), mean (SD), range	66.4, (8.3), 60–85
Gender, *n* (%)	
Male, *n* (%)	104 (49.5%)
Female, *n* (%)	106 (50.5%)
Severity of dementia	
Mild, *n* (%)	124 (59%)
Moderate, *n* (%)	86 (41%)
Level of education	
Less than high school education, *n* (%)	110 (52.5%)
High school education and more, *n* (%)	100 (47.5%)
Care home	
Care home 1, *n* (%)	55 (26%)
Care home 2, *n* (%)	115 (54.8%)
Care home 3, *n* (%)	40 (19.2%)

Source: Table by author

exceptionally relevant ratings from the expert panel, culminating in a notable CVI scale rating of 1.0 for factors related to mood and comfort.

Internal consistency

The Arabic version of HCS has an acceptable level of internal consistency, with a Cronbach's alpha of 0.82. Most subscales had high levels of internal consistency, with Cronbach's alpha values of 0.87, 0.85 and 0.86 for conversation, awareness and knowledge and communication, respectively. Table 2 displays the results of the correlated items to total correlation and Cronbach's alpha coefficient with the deletion of items from the translated scale (Arabic HCS).

Moreover, the internal consistency and test-retest reliability (after two to nine days) of the Arabic HCS's entire scale demonstrated strong levels of internal consistency, with a split-half coefficient of 0.89 and an ICC of 0.92 recorded. Table 3 displays the results of reliability testing for the Arabic HCS.

Construct validity

The analysis of the data using exploratory factor analysis (EFA) was found to be reliable, as evidenced by the significant result of Bartlett's sphericity test ($p = 0.001$)

Table 2 Correlated item to total correlation and Cronbach's coefficient alpha of item deleted from Arabic HCS scale

Items	*Corrected item-total correlation*	*Cronbach's alpha if item deleted*
A. Conversation sub-total score, Cronbach's alpha = 0.872		
1. Response	0.868	0.838
2. Interest in past events	0.844	0.839
3. Pleasure	0.813	0.839
4. Humor	0.874	0.837
B. Awareness and knowledge sub-total score, Cronbach's alpha = 0.851		
5. Names	0.821	0.847
6. General orientation	0.863	0.853
7. General knowledge	0.853	0.828
8. Ability to join in games, etc.	0.904	0.853
C. Communication sub-total score, Cronbach's alpha = 0.862		
9. Speech	0.802	0.829
10. Attempts at communication	0.814	0.835
11. Interest and response to objects	0.852	0.837
12. Success in communication	0.867	0.835

Source: Table by authors

Table 3 Reliability testing for Arabic HCS scale

Items	*Internal consistency (Cronbach's alpha)*	*Internal consistency (split-half coefficient)*	*Test-retest reliability (ICC)*
Arabic HCS entire scale	0.88	0.89	0.92
Conversation sub-total score	0.87		0.92
Awareness and knowledge sub-total score	0.90		0.91
Communication sub-total score	0.91		0.93

Source: Table by authors

and the satisfactory value of 0.92 obtained in the KMO measure. The FA revealed a one-component structure accounting for 60% of the variance, according to the eigenvalue 1 criterion and scree plot inspection. To assess the HCS's original three subgroups structure, a three-factor analysis was conducted, and it was discovered that the three components explained 77.2% of the variation. Factor 1 had a Cronbach's alpha of 0.85 and accounted for 65.2% of the variance, while factors 2 and 3 had Cronbach's alphas of 0.87 and 0.85, respectively, accounting for 8.7% and 3.3% of the variance. The loadings on the three criteria were largely strong, with the majority of items heavily loaded on only one factor. However, upon examining the scree plot, a clear break was observed after the first component (Table 4).

Discussion

Our study aimed to assess the reliability and validity of the Arabic version of the HCS among old people with dementia residing in care homes. We conducted examination of its psychometric properties within this unique population.

Our findings support the face and content validity of the HCS tool. An expert panel of four randomly selected elderly individuals found the Arabic version to be appropriate. Additionally, a content validity review conducted by three independent nursing professors using the Content Validity Index (CVI) confirmed the questionnaire's comprehensiveness and relevance to our research questions. The attainment of a CVI score of 1 for mood and comfort further strengthened its content validity.

Our study revealed strong internal consistency, with Cronbach's alpha coefficients ranging from 0.82 to 0.87, confirming the reliability of the Arabic version of HCS. However, these coefficients differed slightly from the original study, possibly due to the distinct demographic composition of our sample, comprising old people with dementia in care homes. Our findings also echoed the original study's suggestion that excessively high Cronbach's alpha coefficients should be scrutinized for potential redundancy within item constructs. The HCS scale exhibited robust test-retest reliability, as indicated by a split-half coefficient of 0.89 and an intraclass correlation coefficient (ICC) of 0.92, affirming its stability over time.

Our study revealed unexpected correlations among communication elements within our sample, emphasizing the complex interplay influenced by cultural and cognitive

Table 4 Three component structure of the Holden Communication Scale (HCS)

	Component 1	*Component 2*	*Component 3*
8. Ability to join in games, etc.	*0.921*	0.024	0.063
11. Interest and response to objects	*0.741*	0.025	0.034
4. Humor	*0.542*	0.087	0.035
3. Pleasure	*0.481*	0.093	0.152
1. Response	0.076	*0.883*	0.074
6. General orientation	0.068	*0.886*	0.056
7. General knowledge	0.048	*0.563*	0.087
5. Names	0.056	*0.776*	0.056
2. Interest in past events	0.253	0.074	*0.456*
9. Speech	0.153	0.025	*0.865*
10. Attempts at communication	0.183	0.080	*0.796*
12. Success in communication	0.098	0.056	*0.812*
Explained variance	*65.2%*	*8.7%*	*3.3%*
Cronbach's α	*0.85*	*0.87*	*0.85*

Note: *Italic* formatting highlights the three components
Source: Table by authors

factors. These correlations, such as the strong correlation (0.76) between speech and attempts at communication, warrant further investigation to understand their underlying complexities, especially in the context of interventions targeting improved communication in elderly individuals with dementia. Similarly, the correlation between pleasure and humor (0.71), different from the original study, highlights the importance of considering cultural and contextual factors in shaping emotional experiences within this population.

Factor analysis identified a one-component structure explaining 60% of the variance and a three-factor structure explaining 77.2% of the variance in the Arabic version of HCS. While we successfully replicated the original three-factor structure, slight differences prompted reconsideration of item grouping for alignment with the original subscales. Moreover, the correlation between cognitive function and communication ability, while sharing similarities with the original study's findings, presented differences across various stages of dementia.

Our study's focus on elderly individuals with dementia in Jordanian care homes is acknowledged. Future research should undertake comparative analyses with diverse studies, including investigations involving the original version of the HCS questionnaire and broader demographic populations to enhance the breadth of our conclusions.

Furthermore, our study offers insights for researchers employing similar instruments in diverse settings. Recommendations from our expert panel, such as modifications to the Likert scale and the inclusion of imperative sentences for better comprehension among Arabic speakers, highlight the importance of linguistic and cultural considerations in adapting and using assessment tools in various populations.

Methodological consideration

Despite the strength of the current study, there were some study limitations that hinder the generalizability and should be addressed in future research studies. First, the study sample was limited to Jordanian residents of care homes, which may not be representative of the old people in other contexts or countries. To enhance the generalizability of the findings, future research should include a more diverse sample. Second, the study relied on self-reported data collection, which is susceptible to response bias. Future research should consider validating its findings with objective measures. The absence of a comparison group makes it difficult to determine the discriminant validity of the HCS.

Conclusion

The current study confirms the reliability and validity of the Arabic version of the HCS instrument for assessing the communication of elderly Jordanians residing in care homes. The Arabic version of HCS can be used to evaluate the quality of healthcare provided to elderly residents of care homes and to detect changes in their care needs over time. The study findings may be relevant to the interventions being developed to enhance the quality of care provided to elderly residents of care homes, as well as to help health-care professionals assess the ability of persons with dementia to communicate effectively.

References

Abdalrahim, A., Carter, T., Abu Khait, A., Clissett, P. and Blake, H. (2022a), "The use of digital touch screen technology to deliver reminiscence therapy among people with dementia in Jordanian care homes: a mixed-method feasibility study", *Psychogeriatrics*, Vol. 22 No. 2, pp. 187-201, doi: 10.1111/psyg.12798.

Abdalrahim, A., Alkhawaldeh, A., Al-Amer, R.M. and Bani Salameh, A. (2022b), "An analysis of nursing and medical students' attitudes towards and knowledge of Alzheimer's disease (AD)", *International Journal of Nursing Education Scholarship*, Vol. 19 No. 1, doi: 10.1515/ijnes-2022-0033.

Abdelrahman, H.M.M. and El Gaafary, M.M. (2014), "Validation of arabic version of Saint-Louis-University-Mental-Status (SLUMS)-examination and prevalence of cognitive impairment in community dwelling Egyptian older adults", *Middle East Journal of Age and Ageing*, Vol. 83 No. 1492, pp. 1-9.

Banovic, S., Zunic, L.J. and Sinanovic, O. (2018), "Communication difficulties as a result of dementia", *Materia Socio Medica*, Vol. 30 No. 2, pp. 221-224, doi: 10.5455/msm.2018.30.221-224.

Beaton, D.E., Bombardier, C., Guillemin, F. and Ferraz, M.B. (2000), "Guidelines for the process of cross-cultural adaptation of self-report measures", *Spine*, Vol. 25 No. 24, pp. 3186-3191, doi: 10.1097/00007632-200012150-00014.

DeVon, H.A., Block, M.E., Moyle-Wright, P., Ernst, D.M., Hayden, S.J., Lazzara, D.J. and Kostas-Polston, E. (2007), "A psychometric toolbox for testing validity and reliability", *Journal of Nursing Scholarship*, Vol. 39 No. 2, pp. 155-164.

Edvardsson, D., Winblad, B. and Sandman, P.O. (2008), "Person-centred care of people with severe Alzheimer's disease: current status and ways forward", *The Lancet Neurology*, Vol. 7 No. 4, pp. 362-367, doi: 10.1016/s1474-4422(08)70063-2.

Fazio, S., Pace, D., Flinner, J. and Kallmyer, B. (2018), "The fundamentals of person-centered care for individuals with dementia", *The Gerontologist*, Vol. 58 No. suppl_1, pp. S10-S19, doi: 10.1093/geront/gnx122%J.

Kempler, D. and Goral, M. (2008), "Language and dementia: neuropsychological aspects", *Annual Review of Applied Linguistics*, Vol. 28, pp. 73-90, doi: 10.1017/s0267190508080045.

Lankford, W.F., Lynn, K.G., Kossler, W.J., Fiory, A.T., Minnich, R.P. and Stronach, C.E. (1981), "Current techniques in muon spin rotation experiments", *Nuclear Instruments and Methods in Physics Research*, Vol. 185 Nos 1/3, pp. 469-480, doi: 10.1016/0029-554X(81)91245-3.

Leary, M.R. (2021), "Emotional reactions to threats to acceptance and belonging: a retrospective look at the big picture", *Australian Journal of Psychology*, Vol. 73 No. 1, pp. 4-11, doi: 10.1080/00049530.2021.1883410.

Strøm, B.S., Engedal, K., Šaltytė Benth, J. and Grov, E.K. (2016), "Psychometric evaluation of the holden communication scale (HCS) for persons with dementia", *BMJ Open*, Vol. 6 No. 12, p. e013447, doi: 10.1136/bmjopen-2016-013447.

World Health Organization (WHO) (2021), "Dementia key facts", available at: www.who.int/news-room/fact-sheets/detail/dementia

Further reading

Abu-Helalah, M.A., Alqahtani, A.M. and Abdulrahman, K.A. (2019), "Health care-seeking behavior among elderly Jordanians living in Amman: a cross-sectional study", *Journal of Primary Care & Community Health*, Vol. 10, pp. 1-8.

Al-Ali, N.M., Al-Ajlouni, Y.A. and Khader, Y.S. (2017), "Aging in Jordan", *Geriatrics & Gerontology International*, Vol. 17, pp. 1349-1356.

Author affiliations

Abdullah Alkhawaldeh is based at the Al al-Bayt University, Mafraq, Jordan.

Asem Abdalrahim is based at the Princess Salma Faculty of Nursing, Al al-Bayt University, Mafraq, Jordan.

Mohammad Saleh is based at the The University of Jordan, Amman, Jordan.

Ahmad Ayed is based at the Arab American University Palestine, Jenin, Palestinian Authority.

Anas Nawwaf Abed Alrohman Ababneh is based at the Yarmouk University, Irbid, Jordan and Applied Science Research Center, Applied Science Private University, Amman, Jordan.

Mohammad Rababa and Alaa Dalky are both based at the Jordan University of Science and Technology, Irbid, Jordan.

Rasmieh Al-Amer is based at the Isra University, Amman, Jordan and Faculty of Nursing, Yarmouk University, Irbid, Jordan.

Sami Al-Rawashdeh is based at the The Hashemite University, Zarqa, Jordan.

Omar Al Omari is based at the Sultan Qaboos University, Muscat, Oman.

Mohammed ALBashtawy is based at the Al al-Bayt University, Mafraq, Jordan.

Islam Oweidat is based at the Faculty of Nursing, Zarqa Private University, Zarqa, Jordan.

Haitham Khatatbeh is based at the Faculty of Nursing, Jerash University, Jerash, Jordan.

Zaid ALBashtawy is based at the Faculty of Medicine, Yarmouk University, Irbid, Jordan.

Corresponding author

Anas Nawwaf Abed Alrohman Ababneh can be contacted at: anasnawwaf@yahoo.com