Chronic diseases, depressive symptoms and functional limitation amongst older people in rural Malaysia, a middle income developing country

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A B S T R A C T

Objectives. To determine prevalence and prevalence ratio of functional limitation amongst older people with combined chronic diseases and co-morbid depressive symptoms compared with older people with either chronic disease or depressive symptoms alone.

Methods. Data were analysed from a cross-sectional study of 765 people aged 60 years and over, conducted from 2007 to 2008 in Malaysia. Chronic diseases were self-reported, depressive symptoms were measured using the Geriatric Depression Scale and functional limitation was assessed using the Tinetti Performance Oriented Mobility Assessment Tool.

Results. A higher proportion of older people with combined chronic diseases and depressive symptoms reported having functional limitation (44.7%) compared with older people with chronic diseases alone (12.5%) and depressive symptoms alone (18.1%). Adjusting for socio-demographic characteristics, cognitive status and living arrangements, chronic diseases were associated with functional limitation (PR 2.21, 95% CI 1.31, 3.72). Depressive symptoms were also associated with functional limitation (PR 2.07, 95% CI 1.56, 2.76). The prevalence ratio for functional limitation was much greater for combined chronic diseases and depressive symptoms (PR 4.09, 95% CI 2.23, 7.51).

Conclusions. Older people with combined chronic diseases and depressive symptoms are more likely to have functional limitation than those with chronic disease or depressive symptoms alone.

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Introduction

The number of older people in the developing countries is expected to grow over the next fifty years (Kinsella and Wan, 2009). As our population gets older functional limitation will become a public health problem (Zhao et al., 2009). The WHO International Classification of Functioning, Disability and Health defines limitation as difficulties an individual may have in executing activities relating to mobility, self care or domestic life (World Health Organization, 2001).

Chronic diseases and depression occurs commonly in older people (Saba et al., 2007; Scott et al., 2007; Scott et al., 2009). These diseases are fast replacing communicable diseases in developing countries. In developing countries, chronic diseases have also been reported to co-exist with psychological morbidity (Honyashiki et al., 2011). Studies from developed countries have shown that older people with chronic disease and depression have higher levels of disability and functional limitation. However, information is sparse from the rural and underserved population of older people in developing countries.

This study aims to determine the prevalence and prevalence ratio of functional limitation amongst older people with combined chronic diseases and co-morbid depressive symptoms compared to those with either chronic disease or depressive symptoms alone in rural Malaysia.

Materials and methods

Study population

The Alor Gajah Older People Health Survey (AGOPHS) was conducted between May 2007 and November 2008 (Hairi et al., 2010). The target population was all non-institutionalised older people age 60 years and over living in the community of Masjid Tanah. Sampling frame was obtained from a comprehensive community list. All elderly were invited to the Health Clinic for physical examination.

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gait and balance of older people. Maximum score for the gait and balance components are 12 and 16 points respectively. Participants with scores below 12 or below 16 were classified as having functional limitation (Bergamini et al., 2007).

Chronic diseases were assessed by this question: “Has your doctor ever told you that you suffer from... (disease)?” The diseases include: diabetes, epilepsy, hypertension, heart attack, coronary or myocardial infarction, angina, congestive heart failure, chronic lung disease, asthma, stroke and arthritis. Depressive symptoms were assessed using the Geriatric Depression Scale 15 item (Yesavage et al., 1983). Scores range from 0 to 15, with six or more indicating depressive symptoms. Based on the above, four disease categories were created: no chronic diseases and no depressive symptoms, chronic diseases alone, depressive symptoms alone and chronic diseases and depressive symptoms.

Age, sex, ethnic group, education level, cognitive status and living arrangements were considered as potential confounders. Ethnic group was self reported. Cognitive function was assessed using the Elderly Cognitive Assessment Questionnaire (ECAQ) (Kua and Ko, 1992). Participants with cognitive impairment were identified through scores of less than five based on the ECAQ and were removed from the analysis (n = 27). Social support was assessed using the Lubben Social Network Scale that measures levels of social interaction with relatives and friends. A score below 20 suggests at risk of isolation (Lubben, 1988).

This study was approved by the Medical Ethics Committee, University Malaya Medical Centre, Kuala Lumpur and the Ministry of Health, Malaysia.

Statistical analyses
Prevalence ratios (PR) were calculated instead of odds ratio (OR) as the prevalence of functional limitation was relatively high (14%) (Barros and Hirakata, 2003). All statistical analyses were carried out using SAS Proc Genmod’s log binomial regression and Poisson regression with robust variance (when binomial regression models did not converge) (SAS Institute, Inc., Cary North Carolina). To provide more insight an additive PR was reported using Synergy Index (SI) (Anderson et al., 2005). In the absence of interaction SI equals to 1, a value greater than 1 indicates positive synergistic effect.

Results
Of the 907 persons eligible, 765 (84.3%) participated in the interview and geriatric assessment. The majority of the respondents were female (62.6%), Malays (76.0%), had no formal education or primary education (89.0%), married (63.3%), were living with others (88.6%) and were not at risk of isolation (79.0%). The majority of respondents had one chronic disease (54.4%) whilst 13.1% had more than one chronic disease and only 22.7% had depressive symptoms (Table 1).

Forty-five percent of older people with chronic diseases and depressive symptoms reported having functional limitation in contrast to 13% of those with chronic diseases alone, 18% of those with depressive symptoms alone, and 6% of older people with neither depression nor visual impairment (Fig. 1).

In the unadjusted models, older people with chronic diseases and depressive symptoms (PR 7.27, 95% CI 4.05, 13.05) had significantly higher prevalence ratio of functional limitation compared with older people with either chronic diseases (PR 3.27, 95% CI 2.04, 5.24) or depressive symptoms alone (PR 2.50, 95% CI 1.87, 3.34). This pattern remains after adjusting for age, gender, ethnic group, education level, cognitive status and living arrangements. In the multivariate model, the prevalence ratio for functional limitation was much greater when combined chronic diseases and depressive symptoms were present (PR 4.09, 95% CI 2.23, 7.51). The SI was 2.11, indicating presence of interaction. Similar patterns were observed in the relationship between chronic disease severity (one and more than one), depressive symptoms and functional limitation (Table 2).

Discussion
We found that older people with combined chronic diseases and depressive symptoms were more likely to have functional limitation.

![Fig. 1](https://example.com/fig1.png)

**Fig. 1.** Prevalence of functional limitation among older people in rural Malaysia by disease status in 2008.
The increased risk of functional limitation reflects the individual risk contributed by chronic diseases and depressive symptoms separately. The capacity of our organs to perform its physiological activity, or cumulative functional reserve is a product of the sum total of reserve physiological, sensory, cognitive and psychological domains (Fried et al., 2004). Loss of reserve in any one domain reduces functional reserve; a coexisting loss in two domains would expect an additive effect on the overall function (Fried et al., 2004).

A limitation of this study is the design does not allow us to draw causal inferences. Nonetheless, we examined the individual and joint associations between chronic diseases and depressive symptoms and functional limitation, addressing a significant limitation in the existing research of functional limitation.

This study adds to existing literature by showing that older people in rural developing countries with combined chronic diseases and depressive symptoms are more likely to have functional limitation than those with chronic diseases or depressive symptoms alone. This suggests that treating depression and chronic diseases would reduce functional limitation. This may prove difficult as there is lack of infrastructure and expertise for geriatric care in rural Malaysia (Ong, 2002; Philip J-H et al., 2004). Infrastructure support and human resource availability for the care of the elderly has been progressing slowly in Malaysia (Ong, 2007). The elderly in rural Malaysia tend to reside with their family. In caring for those with functional limitation, domiciliary care helps to lighten the demand on a long term basis. These services are limited in rural Malaysia (Population and Housing Census of Malaysia, 2005). Heavy reliance on informal care also carries its own cost as the caregivers themselves need support. To date there is still no policy on support for caregivers. Malaysia will need to improve its healthcare delivery swiftly and more needs to be done to retain the present arrangement where provision of the elderly care largely relies on the family.

Conflict of interest statement
The authors declare that they have no conflicts of interest.

Authors’ contributions
NNH: study concept, chief investigator, designing research protocol, data analysis, interpretation of data and writing manuscript. AB, IM, MAS contributed in conceptualising the research and data collection. AB contributed in critically editing the manuscript. All authors read and approved the final manuscript.

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