

Prevalence of anxiety and depression among patients hospitalised with acute febrile illness

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ABSTRACT

Introduction: Acute febrile illnesses (AFI) such as dengue, leptospirosis, and influenza result in large numbers of hospitalisation in the tropics. These illnesses may negatively impact patients' mental health. The prevalence of anxiety and depression and risk factors associated with these conditions were evaluated in patients hospitalised with AFI.

Methods: From July- October 2017, a cross-sectional study was conducted on consecutive patients ≥ 12 years of age admitted with AFI to a tertiary care hospital in Sri Lanka. The validated Sinhala translation of Hospital Anxiety and Depression Scale (HADS) was administered to identify the presence and severity of anxiety and depression. The prevalence of anxiety and depression was identified and the association with sociodemographic and clinical characteristics was determined using Chi square and t-tests and multivariable logistic regression.

Results: Of 193 enrolled, 44.6% were male. AFI included dengue (62.7%), viral fever (10.4%), urinary tract infection (6.2%), leptospirosis (4.7%), pneumonia (3.1%) and typhus (0.5%). Overall, 41.4% patients had anxiety and 42.5% had depression. On multivariable analysis, anxiety was associated with awareness of diagnosis (OR=4.3, CI 1.3-13.76, $p=.03$), lower satisfaction score (OR=0.73, CI 0.58-0.92, $p=0.008$) and lower income (OR=1.92, CI 1.03-3.57, $p=0.03$). Depression was associated with anorexia (OR=2.8, CI 1.33-5.87, $p=0.006$) and diarrhoea (OR=2.29, CI 1.17-4.47, $p=0.01$).

Conclusions: Patients hospitalised with AFI had a high prevalence of anxiety and depression. Gastrointestinal symptoms, lower socioeconomic status, and awareness of diagnosis of illness were all associated with anxiety. Our findings may be helpful in developing interventions to counteract anxiety and depression among patients hospitalised with AFI.

Keywords: *Acute febrile illness, Anxiety, Dengue, Depression, Sri Lanka.*

Introduction

Acute febrile illness (AFI) is a common cause of hospitalisation in the tropics and sub-tropics (1). Worldwide, few studies report on the mental health of patients hospitalised with AFI (2, 3). Published studies indicate a high prevalence of anxiety and depression among patients with dengue and other AFI caused by Ebola, Influenza and SARS-CoV-2 (4-9). Illnesses such as acute dengue, in particular, may cause psychological distress among those affected due to the potentially life-threatening nature of the disease (10). Anxiety and depression may have short and long-term ramifications in terms of disease outcome and illness recovery for both the patient and the family (11-13).

In this study, the prevalence and the severity of anxiety and depression were evaluated in patients with AFI admitted to a tertiary care center. The socio-demographic, clinical and other risk factors associated with anxiety and depression were investigated to assist in the development of coping strategies and support systems to improve mental health among patients with AFI.

Methods

Study Cohort

A cross-sectional study was conducted at Teaching Hospital Karapitiya (THK), Galle, the largest tertiary care center (1,800 bed) in the Southern Province of Sri Lanka. The consecutive patients ≥ 12 years, admitted to THK with self-reported or documented fever within one week of admission, from last week of July to end of October 2017 were enrolled to the study. At the time of administration of the scale, the patients may have been acutely febrile or convalescing, but still. None of the questions in the HADS include somatic symptoms relevant to febrile illnesses. Written informed consent was obtained from patients or parents of children 12-17 years of age. Ethical hospitalised clearance was obtained from the Ethics Review Committee of the Faculty of Medicine, University of Ruhuna, Sri Lanka.

Definitions

Since dengue is the most common reason for hospitalisation due to AFI in our setting, dengue and non-dengue AFI groups were analysed separately. Patients with acute dengue were defined as those who had a positive dengue NS1 antigen test or a positive dengue IgM antibody test (if fever >5 days). Patients who were test negative for dengue or who had an alternative clinical diagnosis confirmed or supported by other investigations were considered as non-dengue AFI.

Study Instruments

The Hospital Anxiety and Depression Scale (HADS) developed by Zigmond and Snaith to measure both anxiety and depression among general medical patients was used in this study (14). The Sinhala translation of this tool has been validated in Sri Lanka (15). The validated Sinhala version was administered to patients by the trained study doctors. HADS has 7 items each to estimate the level of anxiety and depression, with each item scored on a scale of 0-3, giving a total score ranging from 0-21 for anxiety and depression each. A HADS score ≥ 8 indicated the presence of anxiety or depression and the level of anxiety or depression was graded as mild (8-11), moderate (12-14) or severe (15-21) according to the HADS instrument.

The information was collected about patients' self-perceived knowledge regarding 6 domains: the current illness diagnosis, etiology, symptoms, treatment, complications and possible preventive measures. A Likert scale was used, with each domain having a score of 0-2, totaling to a maximum of 12. Similarly, information was collected about patients' satisfaction within the three domains of their medical care, nursing care, and facilities provided by the hospital, with each domain scored on a 0-4 scale and a maximum total of 12.

Statistical Methods

The proportion of patients with acute dengue versus non-dengue AFI and the median and interquartile range (IQR) scores on the HADS and Likert scales were determined. The association

between patient's socio-demographic and clinical characteristics with the presence of anxiety or depression were determined. The Chi-square test was used for categorical variables and the t-test for continuous variables. Independent variables with significance of $p < 0.05$ were entered into a multivariable logistic regression model to determine factors that were associated with anxiety and depression separately. All statistical analyses were conducted using STATA, version 11 (STATA Corp, College Station, Texas).

Results

Socio-demographic and Clinical Characteristics in Study Cohort

Of a total of 193 enrolled patients, 86 (44.6%) were male and the median age was 35 years (IQR 25- 53; Table 1). Acute dengue was confirmed in 121 (62.7%) by laboratory testing. Clinical diagnoses among the non-dengue AFI group included unspecified viral fever ($n=20$, 10.4%), urinary tract infection ($n=12$, 6.2%), leptospirosis ($n=9$, 4.7%), pneumonia ($n=6$, 3.1%) and scrub typhus ($n=2$, 0.5%). The majority of patients in this cohort ($n=179$, 92.8%) reported having family support during this acute illness. Most patients reported symptoms such as anorexia ($n=141$, 72.1%), headache ($n=135$, 70.0%), and arthralgia/ myalgia ($n=142$, 73.6%).

Sociodemographic features were not significantly different among dengue versus non-dengue AFI, with the exception of occupation. Patients with dengue were less likely to be unemployed or retired compared to patients with non-dengue AFI (45.5% versus 65.3%, respectively). Patients with dengue were significantly more likely to be symptomatic with headache (75.2% versus 61.1%, $p=0.03$) and arthralgia/myalgia (81.8% versus 59.7%, $p<0.001$) than patients with non-dengue AFI.

Self-Reported Knowledge Score

Almost all ($n=115$, 95%) patients with dengue and a majority ($n=57$, 79%) of patients with non-dengue AFI were aware of their current illness diagnosis, as conveyed to them by their treating physicians.

The median overall score for self-reported knowledge regarding their illness was 5 (IQR 2-6) in the overall study group. A significant difference between the self-reported knowledge scores was present between dengue and non-dengue AFI groups (5, IQR 3.5-6 versus 2, IQR 0-5, $p<0.001$). The source of knowledge was reported as media by 50% and as health care personnel by 40%. Two-thirds of dengue patients ($n=81$, 66.9%) reported their source of knowledge as media, compared to 20.8% (15) in the non-dengue AFI group.

Anxiety and Depression in the Overall Study Cohort

In the overall study group, the median HADS anxiety score was 7 (IQR 4-9) and the median HADS depression score was 7 (IQR 4-10). Overall, 80 (41.4%) patients had anxiety and 82 (42.5%) had depression according to the HADS scoring. A total of 110 (56.99%) had either anxiety or depression, while 52 (26.9%) had both anxiety and depression. Among the 80 patients with anxiety in the overall study cohort, 52 (26.9%) had mild anxiety, 20 (10.4%) had moderate anxiety, and 8 (4.2%) had severe anxiety. Among the 82 patients with depression in the overall study cohort, 34 (17.6%) had mild depression, 36 (18.7%) had moderate depression, and 12 (6.2%) had severe depression.

Unadjusted Analysis of Socio-demographic and Clinical Features Associated with Anxiety or Depression

Among the study cohort, patients with anxiety were more likely to be from lower-income groups than patients from higher-income groups (46.3% vs 31.0, $p=0.03$; Table 2). No socio-demographic features were associated with depression. Anorexia (81.3% vs 67.3%, $p=0.03$), diarrhoea (36.3% vs 21.2%, $p=0.02$), and arthralgia/ myalgia (81.3% vs 68.1%, $p=0.04$) were associated with anxiety. Anorexia (85.4% vs 64.0%, $p=0.001$), headache (82.9% vs 60.4%, $p=0.001$), vomiting (62.2% vs 41.4%, $p=0.004$), diarrhoea (39.0% vs 18.9% $p=0.002$), and abdominal pain (32.9% vs 19.8.0%, $p=0.04$) were associated with depression. Awareness of diagnosis (95.0% vs 86.0%, $p=0.03$) and having lower overall satisfaction scores were associated with anxiety ($p=0.007$). Knowledge and satisfaction scores were not associated with depression.

Table 1: Socio-demographic and clinical characteristics of patients with dengue and non-dengue acute febrile illness.

	Total number (%) or median (IQR) n=193	Dengue number (%) or median (IQR) n=121	Non-dengue AFI number (%) or median (IQR) n=72	p value
Socio-demographic characteristics				
Age (years)	35 (25-53)	32 (23- 47)	42.5 (24.0-63.0)	0.01
Male	86 (44.6)	61 (50.4)	25 (34.7)	0.03
Hospital distance (km)	13.0 (5-25)	13.0 (5.0- 20.5)	15.0 (5.5- 30.0)	0.19
Education				
Up to GCE O/L (10 th grade)	52 (26.9)	29 (24.0)	23 (31.9)	0.27
Passed GCE O/L (10 th grade)	75 (38.9)	46 (38.0)	29 (40.3)	
GCE A/L or above (12 th grade)	66 (34.2)	46 (38.0)	20 (27.9)	
Occupation				
Office/ factory/ business	53 (27.7)	40 (33.1)	13 (18.1)	0.01
Laborer/ agriculture	38 (19.7)	26 (21.5)	12 (16.7)	
Unemployed/ retired/ Student	102 (52.9)	55 (45.5)	47 (65.3)	
Marital status - married	123 (63.7)	73 (60.3)	50 (69.4)	0.12
Income per month				
≤25,000 Rs/ ≤162.86 USD*	72 (37.3)	43 (35.5)	29 (40.3)	0.54
>25,000 Rs/ >162.86 USD*	121 (62.7)	78 (64.5)	43 (59.7)	
Family support present	179 (92.8)	113 (93.4)	66 (91.7)	0.66
Clinical features				
Days fever prior to admission	3 (2-4)	3 (2-4)	3 (2-5)	<0.001
Days of hospitalization at enrollment	3 (2-4)	3 (2-4)	3 (2-5)	0.04
Anorexia	141 (73.1)	89 (73.6)	52 (72.2)	0.84
Headache	135 (70.0)	91 (75.21)	44 (61.1)	0.04
Vomiting	97 (50.3)	60 (49.6)	37 (51.4)	0.81
Diarrhoea	53 (27.5)	37 (30.6)	16 (22.2)	0.21
Arthralgia/ myalgia	142 (73.6)	99 (81.8)	43 (59.7)	<0.001
Cough	44 (22.8)	29 (24.0)	15 (20.8)	0.62
Abdominal pain	49 (25.4)	24 (19.8)	25 (34.7)	0.02
Comorbidities ⁺	54 (28.0)	22 (18.2)	32 (44.4)	<0.001
Receipt of oral medications	188 (97.4)	117 (96.7)	71 (98.6)	0.43
Receipt of intravenous medications	69 (35.8)	24 (19.8)	45 (62.5)	<0.001
Receipt of intravenous fluid	167 (86.5)	110 (90.9)	57 (79.2)	0.03
Patients' perceptions regarding their illness				
Patient awareness of diagnosis	172 (89.1)	115 (95.0)	57 (79.2)	0.001
Self-perceived knowledge score (out of maximal 12)	5 (2-6)	5 (3.5-6)	2 (0-5)	<0.001
Overall satisfaction score (out of maximal 12)	9 (9-11)	9 (9-11)	9 (9-11)	0.94

AFI = Acute Febrile Illness; GCE O/L = General Certificate of Education Ordinary Level, 10th grade; GCE A/L = General Certificate of Education Advanced Level, 12th Grade.* 1 USD = Rs. 153.51 in July 2017 (22); ⁺Diabetes mellitus, hypertension, dyslipidemia, ischemic heart disease, asthma.

Table 2: Socio-demographic and clinical characteristics associated with anxiety and depression among patients with acute febrile illness in Sri Lanka.

Characteristic	Anxiety		Depression					
	Present Number (%) or median (IQR) n= 80	Absent Number (%) or median (IQR) n= 113	OR (CI)	p- value	Present Number (%) n=82	Absent Number (%) n=111	OR (CI)	p- value
Age (years)	36.5 (23.3-59.3)	35.0 (23.0-52.0)		0.33	36.0 (23.0-55.3)	35.0 (23.0-53.0)		0.67
Male	33 (41.3)	53 (46.9)	0.80 (0.45-1.42)	0.44	34 (41.5)	52 (46.9)	0.80 (0.45-1.43)	0.46
Education								
Up to GCE O/L (10 th grade)	19 (23.8)	33 (29.2)	0.76 (0.37- 1.52)	0.40	22 (26.8)	30 (27.0)	0.99 (0.49- 1.97)	0.98
Passed GCE O/L (10 th grade)	36 (45.0)	39 (34.5)	1.55 (0.83- 2.91)	0.14	33(40.2)	42 (37.8)	1.11 (0.59- 2.07)	0.73
GCE A/L or above (12 th grade)	25 (31.3)	41 (36.3)	0.80 (0.41-1.53)	0.47	27 (32.9)	39 (35.1)	0.91 (0.47- 1.73)	0.75
Marital status- married	55 (68.8)	68 (60.2)	1.48 (0.77-2.87)	0.21	55 (67.1)	68 (61.3)	1.31 (0.68-2.51)	0.39
Income per month								
≤25,000 Rs/ ≤162.86 USD*	37 (46.3)	35 (31.0)	1.01 (1.06-3.62)	0.03	29 (35.4)	43 (38.7)	0.87 (0.46-1.63)	0.63
Family support present	74 (92.5)	105 (92.9)	0.94 (0.27-3.43)	0.91	76 (92.7)	103 (92.8)	0.98 (0.29- 3.59)	0.98
Anorexia	65 (81.3)	76 (67.3)	2.11 (1.02-4.51)	0.03	70 (85.4)	71 (64.0)	3.29 (1.53-7.44)	0.001
Headache	61 (76.3)	74 (65.5)	1.69 (0.85-3.43)	0.11	68 (82.9)	67 (60.4)	3.19 (1.53-6.87)	0.001
Vomiting	41 (51.3)	56 (49.6)	1.07 (0.58-1.98)	0.82	51 (62.2)	46 (41.4)	2.32 (1.24-4.36)	0.004
Diarrhea	29 (36.3)	24 (21.2)	2.11 (1.06-4.21)	0.02	32 (39.0)	21 (18.9)	2.74 (1.36-5.55)	0.002
Arthralgia/ myalgia	65 (81.3)	77 (68.1)	2.03 (0.98-4.34)	0.04	65 (79.27)	77 (69.37)	1.69 (0.83-3.53)	0.12
Cough	22 (27.5)	22 (19.5)	1.57 (0.75-3.26)	0.19	19 (23.2)	25 (22.5)	1.04 (0.49-2.16)	0.92
Abdominal pain	24 (30.0)	25 (22.1)	1.51 (0.74-3.05)	0.22	27 (32.9)	22 (19.8)	1.99 (0.98-4.04)	0.04
Presence of comorbidities ⁺	19 (23.8)	35 (31.0)	0.69 (0.34-1.39)	0.27	24 (29.3)	30 (27.0)	1.12 (0.56-2.21)	0.73
Use of oral drugs	77 (96.3)	111 (98.2)	0.46 (0.04- 4.15)	0.39	78 (95.1)	110 (99.1)	0.18 (0.00- 1.85)	0.09
Use of intravenous drugs	35 (43.8)	34 (30.1)	1.81 (0.95- 3.43)	0.05	34 (41.5)	35 (31.5)	1.54 (0.81- 2.91)	0.15
Use of intravenous fluid	70 (87.5)	97 (85.8)	1.15 (0.46- 3.03)	0.74	71 (86.6)	96 (86.5)	1.01 (0.40- 2.59)	0.98
Patient awareness of diagnosis	76 (95.0)	96 (86.0)	3.36 (1.03-14.24)	0.03	74 (90.2)	98 (88.3)	1.23 (0.44-3.60)	0.67
Self-perceived knowledge score	6 (2-7)	5 (3-7)		0.77	6 (3-7)	5 (2-7)		0.43
Overall satisfaction score	9 (9-10)	9 (9-11)		0.007	9 (9-10)	9 (9-12)		0.06

*Diabetes mellitus, hypertension, dyslipidemia, ischaemic heart disease, asthma - Abbreviations: OR = odds ratio, CI = confidence interval

Adjusted Analysis of Socio-demographic and Clinical Features Associated with Anxiety or Depression

On multivariable analysis, lower income (1.92, 95% CI 1.03 - 3.57), patient awareness of their diagnosis (4.30, 1.3 - 13.76), and overall satisfaction score (OR=0.73, CI 0.58 - 0.92) were associated with anxiety (Table 3). Anorexia (OR=2.8, CI 1.33 - 5.87) and diarrhoea (OR=2.29, CI 1.17 - 4.47) were associated with depression.

The presence of family support, presence of comorbidities, or knowledge score regarding current illness were not associated with anxiety or depression on multivariable analysis.

There was no significant difference between dengue versus non-dengue AFI and the presence of anxiety or depression (43.8% vs 37.5%, $p=0.39$; Table 4). No significant difference was also found between the dengue and non-dengue AFI groups with regards to severity of anxiety or depression.

Table 3: Multivariable analysis of sociodemographic and clinical features associated with anxiety or depression among patients hospitalised with acute febrile illness.

Characteristic	Unadjusted (95% CI)	OR	p -value	Adjusted final model OR (95% CI)	p -value
Anxiety					
Income	1.92 (1.06-3.62)		0.03	1.92 (1.03-3.57)	0.03
Awareness of diagnosis	3.36 (1.03-14.24)		0.03	4.30 (1.3-13.76)	0.01
Satisfaction score			0.007	0.73 (0.58- 0.92)	0.008
Depression					
Anorexia	3.29 (1.53-7.44)		0.03	2.80 (1.33- 5.87)	0.006
Diarrhoea	2.74 (1.36-5.55)		0.02	2.29 (1.17-4.47)	0.01

Abbreviations: OR = odds ratio, CI = confidence interval

Table 4: Anxiety and depression according to the Hospital Anxiety and Depression Scale (HADS) among patients with dengue and non-dengue AFI.

	All patients Number (%) or median (IQR)	Dengue Number (%) or median (IQR)	Non-dengue AFI Number (%) or median (IQR)	p - value
Anxiety present	80 (41.5)	53 (43.8)	27 (37.5)	0.39
Depression present	82 (42.5)	49 (40.5)	33 (45.8)	0.47
Anxiety and depression both present	52 (26.9)	31 (25.6)	21 (29.2)	0.59
Anxiety score	7 (4-9)	7 (4-9)	7 (4-8.5)	0.78
Depression score	7 (4 -10)	7 (4-10)	7 (4-11)	0.51
Anxiety severity				
Mild	52 (26.9)	35 (28.9)	17 (23.6)	0.42
Moderate	20 (10.4)	13 (10.7)	7 (9.7)	0.82
Severe	8 (4.2)	5 (4.1)	3 (4.2)	0.99
Depression severity				
Mild	34 (17.6)	21 (17.4)	13 (18.1)	0.90
Moderate	36 (18.7)	21 (17.4)	15 (20.8)	0.55
Severe	12 (6.2)	7 (5.8)	5 (6.9)	0.75

Abbreviations: AFI = acute febrile illness, IQR = interquartile range

Discussion

We found a high prevalence of anxiety and depression in patients hospitalised with AFI in Sri Lanka. High prevalence of anxiety and depression was seen in patients with both dengue and non-dengue AFI. A diagnosis of dengue was not specifically associated with a higher prevalence of anxiety or depression when compared to other AFI. The majority of the cohort had mild or moderate levels of anxiety and depression, but a small but significant proportion had severe anxiety or depression. Anxiety was associated with lower socioeconomic status, awareness of illness diagnosis, and lower overall satisfaction score. Depression was associated with gastrointestinal symptoms such as anorexia and diarrhoea. Notably, patients with dengue were more aware of their illness diagnosis and had a higher self-reported knowledge score.

According to our findings, 57% of patients hospitalised with AFI had anxiety or depression as measured by the HADS instrument. No other published studies to-date have assessed anxiety and depression in cohorts with AFI, but several studies have reported similar proportions of anxiety or depression among patients with acute dengue or other specific diseases causing AFI. In a study performed by Hashmi *et al.*, using the HADS among patients hospitalised with dengue in Pakistan, 60% met criteria for anxiety and 62.2% met criteria for depression (16). Tran *et al.*, showed 64.1% prevalence of anxiety or depression among patients hospitalised with dengue by applying a health-related quality-of-life (HRQOL) survey in Vietnam (5). In Brazil, a case-control study of patients with chikungunya showed significant levels of anxiety and depression (2). In Taiwan, patients with leptospirosis had a 1.58 - fold higher risk of depression than the general population (3). During the COVID-19 pandemic, multiple studies evaluated anxiety and depression among patients with COVID-19. In a meta-analysis performed by Deng *et al.*, the pooled prevalence of depression and anxiety was 45% and 47%, respectively, among patients with COVID-19 (7). Our study confirms the high levels of anxiety and depression in a cohort with diverse etiologies of AFI, not limited to specific conditions. The underlying reasons for the high prevalence of mental health conditions in patients

with AFI are likely multifactorial. Among older adults, cytokine responses to influenza virus have been shown to be associated with mood disturbance, suggesting one possible pathophysiological link (9).

Of note, we found that gastrointestinal symptoms were associated with a high prevalence of depression. A few other studies have reported an association between symptoms related to the gastrointestinal system and anxiety or depression. In Norway, nausea, heartburn, diarrhoea, and constipation were associated with anxiety and depression when using the HADS instrument in the general population (17). Among patients at 15 primary care clinics in the US, patients with gastrointestinal symptoms such as stomach pain, constipation and diarrhoea were more likely to have anxiety and depression (18). An exact mechanism for the above association is not yet evident.

We found that patients who were aware of their illness diagnosis were more likely to experience anxiety, a finding which contrasts with results from earlier studies. According to a systematic review on the relation between information provision, anxiety, and depression among cancer survivors, satisfied patients and patients with fulfilled information needs had less anxiety and depression (19). Among patients with chronic obstructive pulmonary disease, less disease knowledge was associated with anxiety or depression when using the HADS instrument (20). However, Selinger *et al.*, showed that better disease knowledge was associated with greater anxiety among patients with inflammatory bowel disease (21).

In our study, anxiety was higher among patients of a lower socioeconomic status (generally earning less than USD 5 per day). It is likely that the loss of wages due to the acute illness may result in worse mental health for patients. Patients hospitalised with AFI may benefit from coping strategies to deal with the anxiety and depression associated with their acute illness. Strategies such as positive reframing, acceptance of the stressful situation, and use of humour may be helpful interventions in improving the quality of care of these patients.

Some limitations must be noted. Our study was performed at a single center where dengue was prevalent. However, as the causes of AFI were heterogenous, our findings may be generalisable to other settings with AFI. In addition, the HADS may not apply to acutely depressed or anxious patients, given potential underestimation of depression severity due to its focus on general distress symptoms and difficulty differentiating between physical symptoms of illness and depressive symptoms. Strengths of this study include the use of a locally validated instrument to measure anxiety and depression and the prospective, systematic collection of data.

Conclusions

In our study, patients hospitalised with AFI had a high prevalence of anxiety and depression symptoms. Gastrointestinal symptoms, lower socioeconomic status, better awareness of illness diagnosis and lower satisfaction score were associated with anxiety or depression. Our findings highlight the need for developing interventions to reduce anxiety and depression among patients hospitalised with AFI in similar settings.

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Declaration of Interest statement: The authors declare no conflict of interest.

Informed Consent Statement: Written informed consent was obtained from all subjects or Parents of children involved in the study.

References

1. Rhee C, Kharod GA, Schaad N, Furukawa NW, Vora NM, Blaney DD, *et al.* Global knowledge gaps in acute febrile illness etiologic investigations: A scoping review. *PLoS Neglected Tropical Diseases*. 2019; 13(11): e0007792. <https://doi.org/10.1371/journal.pntd.0007792>
2. de Lima Martins H, dos Santos C, Ribas V, Sougey E, Valenca M. Depression, Anxiety, and Hopelessness in Patients with Chikungunya Fever in Brazil. *Journal of Neuroinfectious Diseases*. 2016; 7(4). <https://doi.org/10.4172/2314-7326.1000236>
3. Chiu CH, Wang YC, Lin CL, Lee FY, Kao CH. Leptospirosis and Depression: A Nationwide Cohort Analysis. *J Clin Psychiatry*. 2017; 78(4): e398-e403. <https://doi.org/10.4088/JCP.16m10773>
4. Gunathilaka N, Chandradasa M, Champika L, Siriwardana S, Wijesooriya L. Delayed anxiety and depressive morbidity among dengue patients in a multi-ethnic urban setting: first report from Sri Lanka. *Int J Ment Health Syst*. 2018; 12: 20. <https://doi.org/10.1186/s13033-018-0202-6>
5. Tran BX, Thu Vu G, Hoang Nguyen L, Tuan Le Nguyen A, Thanh Tran T, Thanh Nguyen B, *et al.* Cost-of-Illness and the Health-Related Quality of Life of Patients in the Dengue Fever Outbreak in Hanoi in 2017. *International Journal of Environmental Research and Public Health*. 2018; 15(6). <https://doi.org/10.3390/ijerph15061174>
6. Herbuela V, de Guzman FS, Sobrepeña GD, Claudio ABF, Tomas ACV, Arriola-Delos Reyes CM, *et al.* Depressive and Anxiety Symptoms among Pediatric In-Patients with Dengue Fever: A Case-Control Study. *International Journal of Environmental Research and Public Health*. 2019; 17(1). <https://doi.org/10.3390/ijerph17010099>
7. Deng J, Zhou F, Hou W, Silver Z, Wong CY, Chang O, *et al.* The prevalence of depression, anxiety, and sleep disturbances in COVID-19 patients: a meta-analysis. *Ann N Y Acad Sci*. 2021; 1486(1): 90-111. <https://doi.org/10.1111/nyas.14506>
8. Secor A, Macauley R, Stan L, Kagone M, Sidikiba S, Sow S, *et al.* Mental health among Ebola survivors in Liberia, Sierra Leone and Guinea: results from a cross-sectional study. *BMJ open*. 2020; 10(5): e035217. <https://doi.org/10.1136/bmjopen-2019-035217>
9. Costanzo ES, Lutgendorf SK, Kohut ML, Nisly N, Rozeboom K, Spooner S, *et al.* Mood and cytokine response to influenza virus in older adults. *J Gerontol A Biol Sci Med Sci*. 2004; 59(12): 1328-33. <https://doi.org/10.1093/gerona/59.12.1328>
10. Daudé É, Mazumdar S, Solanki V. Widespread fear of dengue transmission but poor practices of dengue prevention: A study in the slums of Delhi, India. *PLoS one*. 2017; 12(2): e0171543. <https://doi.org/10.1371/journal.pone.0171543>
11. Sobel RM, Markov D. The impact of anxiety and mood disorders on physical disease: the worried not-so- well. *Curr Psychiatry Rep*. 2005; 7(3): 206-12. <https://doi.org/10.1007/s11920-005-0055-y>

12. Lamers SM, Bolier L, Westerhof GJ, Smit F, Bohlmeijer ET. The impact of emotional well-being on long-term recovery and survival in physical illness: a meta-analysis. *J Behav Med.* 2012; **35**(5): 538-47. <https://doi.org/10.1007/s10865-011-9379-8>.
13. Barnason S, Zimmerman L, Nieveen J, Schulz P, Young L. Patient recovery and transitions after hospitalization for acute cardiac events: an integrative review. *J Cardiovasc Nurs.* 2012; **27**(2): 175-91. <https://doi.org/10.1097/JCN.0b013e318239f5f5>.
14. Stern AF. The hospital anxiety and depression scale. *Occup Med (Lond).* 2014; **64**(5): 393-4. DOI: <https://doi.org/10.1093/occmed/kqu024>.
15. Suraweera C, Hanwella R, Sivayokan S, de Silva V. Rating scales validated for Sri Lankan populations. *Sri Lanka Journal of Population Studies.* 2013; **4**(2): 16-24. <http://dx.doi.org/10.4038/sljpsyc.v4i2.6320>.
16. Hashmi AM, Butt Z, Idrees Z, Niazi M, Yousaf Z, Haider SF, *et al.* Anxiety and depression symptoms in patients with dengue fever and their correlation with symptom severity. *Int J Psychiatry Med.* 2012; **44**(3): 199-210. <https://doi.org/10.2190/PM.44.3.b>.
17. Haug TT, Mykletun A, Dahl AA. Are anxiety and depression related to gastrointestinal symptoms in the general population? *Scand J Gastroenterol.* 2002; **37**(3): 294-8. <https://doi.org/10.1080/003655202317284192>.
18. Mussell M, Kroenke K, Spitzer RL, Williams JB, Herzog W, Löwe B. Gastrointestinal symptoms in primary care: prevalence and association with depression and anxiety. *J Psychosom Res.* 2008; **64**(6): 605-12. <https://doi.org/10.1016/j.jpsychores.2008.02.019>.
19. Husson O, Mols F, van de Poll-Franse LV. The relation between information provision and health-related quality of life, anxiety and depression among cancer survivors: a systematic review. *Ann Oncol.* 2011; **22**(4): 761-72. <https://doi.org/10.1093/annonc/mdq413>.
20. Zhang Q, Liao J, Liao X, Wu X, Wan M, Wang C, *et al.* Disease knowledge level is a noteworthy risk factor of anxiety and depression in patients with chronic obstructive pulmonary disease: a cross-sectional study. *BMC Pulmonary Medicine.* 2014; **14**: 92. <https://doi.org/10.1186/1471-2466-14-92>.
21. Selinger CP, Lal S, Eaden J, Jones DB, Katelaris P, Chapman G, *et al.* Better disease specific patient knowledge is associated with greater anxiety in inflammatory bowel disease. *J Crohns Colitis.* 2013; **7**(6): e214-8. <https://doi.org/10.1016/j.crohns.2012.09.014>.
22. Lanka CBoS. Indicative US Dollar SPOT Exchange Rate 2018 [Available from: <https://www.cbsl.gov.lk/en/rates-and-indicators/exchange-rates/daily-indicative-usd-spot-exchange-rates>].