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Back and neck pain and psychopathology in rural sub-Saharan Africa: Evidence from the Gilgel Gibe Growth and Development Study, Ethiopia

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Introduction

Back (BP) and neck pain (NP) are among the most prevalent pain conditions in developed countries, and are associated with functional disability and missed work.[1] The 12-month prevalence of back or neck pain (BNP) in developed countries ranges between 15% and 66%.[1-7] The 12-month prevalence of BP ranges from 12% to 34%.[8-10] While there are several known risk factors for BNP, one of the most robust is psychopathology.[6, 11-18]

A systematic review of the literature about the association between psychopathology and BNP risk showed that there is a consistent, independent association between stress, distress, anxiety, mood, and depression and BNP.[19] This association has important clinical implications, both for screening and for treatment purposes.[20, 21] However, nearly all of the extant studies reviewed by Linton were located in developed countries and little is known about the association between mood or anxiety disorders and chronic BNP in developing countries.

Demyttenaere and colleagues[22] used data from 18 population surveys from culturally and economically diverse countries that are part of the World Health Survey to produce cross-national comparisons of psychopathology among persons with chronic BNP. Among 85,088

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Institutional Review
The Institutional Review Boards of the University of Michigan and Jimma University reviewed and approved the study protocol.

persons sampled, the study found that the 12-month prevalence of BNP was between 10% and 42%. Also, psychopathologies were more common among persons with chronic BNP after adjusting for age and gender. Second, Gureje and colleagues[23] used data from the Nigerian Survey of Mental Health and Wellbeing, a representative sample with 2,143 respondents from both urban and rural areas around Nigeria. This study found that chronic BNP was present in 16.4% of the sample, and that mood disorders were significantly associated with BNP. A third study found that rates of anxiety and depression were higher among patients with BNP than among patients without BNP in Iran.[24]

The extant studies that have assessed the psychopathological correlates of BNP in developing countries have assessed urban and rural localities together. It has been shown, however, that health metrics differ between rural and urban localities in developing countries and that health in rural localities is often poorer.[25-29] There are no known studies that systematically assess the prevalence and psychopathologic correlates of BNP in the rural, underdeveloped context. In this study we used data from the Gilgel Gibe Growth and Development Study (GGGDS), a population-representative sample from Jimma zone, a rural locality in southwest Ethiopia to 1) assess the prevalence of BP and NP, and 2) assess the relations between symptoms of anxiety, depression, and post-traumatic stress (PTS) and BNP.

Materials and Methods

Sample

This study took place in Jimma zone, southwest Ethiopia in the Gilgel Gibe area outside of Jimma Town. This is a rural area where the primary occupation is subsistence agriculture. In the past years large numbers of inhabitants have been affected by the construction of a hydro-electric dam, which disrupted lives and livelihoods and forced many people from their homes and to relocate to nearby towns and villages.

The Gilgel Gibe Growth and Development Study (GGGDS) is a cohort study of families in the Gilgel Gibe region that is concerned with adult mental health, neurological health, and child development. The study involves questionnaire and anthropometric information collected from the parents, and developmental assessments conducted on their children. We report here on baseline information collected from the parents.

The cohort baseline for the GGGDS was a random sample of households that had a child between the ages of 3-24 months from the universe of all births in Gilgel Gibe in the two years prior to the estimated start date of the survey. We sampled 550 households at baseline. From these 79 households were not included because the children were unable to be located, had died, or had moved from the study area. An additional 20 households were excluded because the father was not living in the household or could not be located. Thus, the overall response rate was 82%.

A structured questionnaire was developed and administered to participants by 10 trained interviewers. Questionnaires and consent documents were developed in English then translated and back translated by native speakers into the two dominant languages in the

study area: Amharic and Affan Oromifa. Households were visited and all of the participants were interviewed in their houses in a private area. Husbands and wives were separately interviewed using questionnaires developed specifically for men and women. Written informed consent was obtained from all participants. The Institutional Review Boards of the University of Michigan and Jimma University reviewed and approved the study protocol.

Survey Domains

Data was collected about age (years), body mass index (BMI), and gender household socioeconomic status (SES). Household SES was measured via an asset scale, as is standard in low-income countries.[30] A set of material assets was asked of each household; items were summed and each household's SES was categorized based on whether the household was above or below the median asset ownership. Women provided corresponding responses to some of the material items and these were highly associated with their partner's responses. We therefore used men's responses as estimates of the household SES. Information on educational attainment was not collected since it is known to be very low in the study population.

Data was also collected about symptoms of depression, anxiety, and PTS. Symptoms of anxiety and depression were measured using the Hopkins Symptoms Checklist (HSCL), an often-used inventory of symptoms of anxiety and depression. The HSCL has been validated in a number of diverse settings, although it has not been validated in Jimma Zone.[31-33] From the HSCL we calculated two variables. We followed established protocols and cut-offs[31] to calculate indicators of high symptoms of anxiety and high symptoms of depression. To do this, we summed across the first 10 items and divided the sum by 10 to create a measure of anxiety and summed across the remaining 15 items and divided by 15 to obtain a measure of depression. For each of these measures, scores greater than or equal to 1.75 were considered evidence of high symptoms of anxiety or high symptoms of depression, as per established protocols.[31] It is important to note that this scale has not been validated in this setting.

The Harvard Trauma Questionnaire (HTQ) was used to measure symptoms of probable PTS. The HTQ consists of two types of questions: those relating to traumatic events, and those probing 16 DSM-IV related PTS symptoms. For the purposes of this analysis, only the items about PTS symptomatology were used. Each item is rated on a 4-point scale with 1 indicating “not at all distressed”, and 4 indicating “extremely distressed”. A mean score greater than 2.5 over all 16 questions indicates probable PTS.[31] The HTQ has been used widely in developing countries, although it has not been validated in our study locality.[31, 34] The HSQL and the HTQ are not diagnostic tools; we rely on these cut-offs because they are used widely in other research studies and therefore facilitate comparisons. Neither instrument has been explicitly validated among this study population.

Obesity is a known risk factor for BP and NP.[19] However, information about BMI was not included as a covariate in this analysis because only one individual with a BMI greater than 25 reported BP, and none reported NP.

Dependant Variables

Our screening tool was derived from the World Health Organization research protocol for measuring the prevalence of neurological disorders in developing countries.[35] A variation of this instrument was used to assess the prevalence of a range of neurological disorders successfully in a suburb of Addis Abba, Ethiopia,[36]. The survey instrument includes questions about one-week history of neurological symptoms including BP and NP. Questions asked were, " In the past week…do you have back pain on a regular basis?" And "In the past week…do you have neck pain on a regular basis?" Answers were coded dichotomously with a 1 indicating a "yes" answer, and a zero indicating a "no" answer. BP and NP were used independently as outcomes of interest.

Statistical Methods

Univariate statistics were used to describe the sample, and bivariate chi-square tests were used to assess relations between each of the covariates and outcomes of interest. We used multivariate logistic regression to assess relations between high symptoms of anxiety, depression, and PTS independently and each of our outcomes of interest after adjusting for age, gender, and SES. The criterion for statistical significance was set at $\alpha = 0.05$. All statistical tests were carried out using SAS 9.1.

Results

Table 1 shows univariate statistics, as well as bivariate chi-square tests between each covariate and outcome of interest. Univariate statistics showed that BP was reported among 16.7% of respondents and NP among 5.0%. Symptoms of anxiety were the most prevalent psychopathology in the sample at 41.9%, followed by symptoms of depression at 36.1%, and then symptoms of PTS at 10.3%. The majority (61.8%) of the study population was between 20 and 29 years of age. The mean number of assets held among the study sample was 0.86 assets. 47.3% of the population owned below the median number of household assets.

In chi-square tests, age was the only covariate not significantly associated with BP. High symptoms of depression ($P<0.01$), anxiety ($P<0.01$) and PTS ($P<0.01$) were each associated with greater BP risk. Female gender ($P<0.01$) and low asset holdings ($P=0.02$) were both also associated with higher BP risk. Neither age nor gender was associated with NP. Symptoms of depression ($P<0.01$), anxiety ($P<0.01$) and PTS ($P=0.03$) were each associated with higher NP risk, as was low asset holdings ($P=0.04$).

Tables 2 and 3 show multivariate logistic regression models of BP (table 2) and NP (table 3). Depression symptomatology was significantly associated with BP (OR=3.44, 95% CI 2.37-5.00) and NP (OR=4.92, 95% CI 2.49-9.74). Anxiety symptomatology was also associated with BP (OR=2.88, 95% CI 1.98-4.20) and NP (OR=2.67, 95% CI 1.41-5.09). PTS symptomatology was only associated with BP (OR=2.89, 95% CI 1.78-4.69). Female gender and low asset index were generally risk factors for each outcome.

Discussion

We assessed the prevalence and psychopathological correlates of BNP in a rural, developing country context. Using representative data from rural southwest Ethiopia, we found that the prevalence of BP was 16.7% and the prevalence of NP was 5.0%. We also found that symptoms of depression, anxiety, and PTS were correlates of BP, and that symptoms of depression and anxiety were correlates of NP, even after allowing for the possible impact of household assets, age, and gender.

The prevalence of BP in developed countries has been estimated to be between 12% and 34%.[8-10] The prevalence of BP in our sample from rural sub-Saharan Africa was 16.7%, which is within this range. The prevalence of NP in developed countries ranges from 18% to 53%, which is higher than the prevalence of NP (5%) in our sample.[9, 37-40] A review of 27 studies assessing the risk for lower back pain in Africa by Louw and colleagues[41] found that the point prevalence of lower back pain ranged from 16-59%. The overall point estimate for lower back pain in Africa was 32%. While the one-week prevalence of BP in our study (16.7%) was lower than the overall estimate, it was within the range quoted in this review. A study by Gureje and colleagues[23] that, like our study, assessed the relation between psychopathology and risk for BNP, found that prevalence of chronic spinal pain in a sample of 2,143 Nigerians was 16.4%, which is comparable to our finding for the prevalence of BP in rural Ethiopia.

We found that symptoms of depression and anxiety were both correlates of BP and NP in rural sub-Saharan Africa. Our finding that depression symptomatology is associated with BNP agrees with a large literature about the psychopathologic co-morbidities of BP and NP both in developed[6, 11, 13, 16, 19, 38, 42-54] and developing countries.[22-24]

Our finding that anxiety symptomatology is also a correlate of BNP in a rural, developing country context agrees with several studies that have assessed the relation between anxiety and risk for BNP in developed countries.[6, 16, 19, 22, 24, 44, 46, 47, 49, 50, 52, 53, 55-58] However, in the only other study that has assessed the psychopathologic co-morbities of BNP in sub-Saharan Africa, Gureje[23] showed that anxiety was not associated with BNP in bivariate or multivariate models in Nigeria. This difference in observations may reflect differences in somatization of mental disorders in Nigeria and Ethiopia.

There is a paucity of research that has assessed the relation between PTS and BP and NP. However, our finding that PTS symptomatology is associated with BP in rural sub-Saharan Africa agrees with that of Harris[59] who found that among a cohort of 1,156 survivors of major traumatic events in Australia, PTS up to 6 years after the event was the strongest predictor of BP.

There are several limitations that should be considered when interpreting our findings. First, our study instruments have not been validated for use in our study population. We caution readers not to interpret our results in terms of depression, anxiety, and PTS, but rather what might be construed as high symptoms of these psychopathologies. Second, symptoms of psychopathology were highly prevalent among our study population, likely linked to population disruption and high prevalence of traumatic events in this population. This may

suggest that our findings may not be generalize to other populations with lower prevalence of psychopathology. Third, because we sampled only households with children, it is possible that our findings do not generalize to households without children. Fourth, our covariate set was limited and therefore, there may be residual confounding of the association between psychopathologic symptomatology and BNP. Fifth, because this is a cross-sectional analysis, we cannot draw conclusions about the directionality of the associations that we have found between our covariates and outcomes of interest.

Despite these limitations, our findings have several important implications for clinicians and researchers. First, this study has shown that symptoms of common psychopathologies are determinants of BNP in the rural, developing country context. Therefore, clinicians working in these contexts would be responsible to consider common psychopathologies when assessing patients presenting with chronic BNP. Second, our study suggests that the prevalence and psychopathologic correlates of BNP in the rural, underdeveloped context are similar to those in other localities. Investigators interested in the effects of rural and urban contexts on health should consider comparative studies of the prevalence and psychopathologic correlates of chronic pain conditions between urban and rural contexts in developing countries. Third, we have shown that psychopathologic symptomatology is correlated with two chronic pain conditions in rural sub-Saharan Africa. Investigators interested in the epidemiology of chronic pain conditions should assess the relations between psychopathology and other chronic pain conditions in rural, developing contexts.

Our paper also highlights the dire importance for researchers interested in the epidemiology of chronic pain conditions in the developing world to modify, create, and validate instruments to meet the growing clinical demand and research interest in chronic pain epidemiology in the developing context. This demand is particularly timely as populations in the developing world begin to age. Moreover, such tools will be particularly important in agricultural settings because chronic pain may have dramatic and negative impacts on productivity, with catastrophic consequences for household food security.

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Table 1

Descriptive Statistics and Bivariate associations between each covariate and pain indicator among 900 respondents in Southwest Ethiopia

			Back Pain			Neck Pain		
Covariates	**Total**	**%**	**N**	**%**	**P**	**N**	**%**	**P**
Total	900	N/A	150	16.7		45	5.0	
Depression					<0.01			<0.01
no	575	63.9	57	9.9		12	2.1	
yes	325	36.1	93	28.6		33	10.2	
Anxiety					<0.01			<0.01
no	523	58.1	52	9.9		15	2.9	
yes	377	41.9	98	26.0		30	8.0	
PTS					<0.01			0.03
no	807	93.0	113	14.0		36	4.5	
yes	89.67	10.3	37	39.8		9	9.7	
Gender					<0.01			0.09
male	450	50.0	48	10.7		17	3.8	
female	450	50.0	102	22.7		28	6.2	
Asset Index					0.02			0.04
high	474	52.7	66	13.9		17	3.6	
low	426	47.3	84	19.7		28	6.6	
Age					0.29			0.81
<20	35	3.9	4	11.4		1	2.9	
20-29	556	61.8	87	15.7		26	4.7	
30-39	246	27.3	50	20.3		14	5.7	
>39	63	7.0	9	14.3		4	6.4	

Table 2

Multivariate regression models of psychopathologic symptomology and back pain among 900 respondents in Southwest Ethiopia

	Depression		Anxiety		PTS	
	OR	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Depression						
no	Ref	Ref				
yes	3.44	2.37-5.00				
Anxiety						
no			Ref	Ref		
yes			2.88	1.98-4.20		
PTS						
no					Ref	Ref
yes					2.89	1.78-4.69
Gender						
male	Ref	Ref	Ref	Ref	Ref	Ref
female	3.28	2.12-5.07	2.97	1.93-4.58	2.73	1.76-4.25
Asset Index						
high	Ref	Ref	Ref	Ref	Ref	Ref
low	1.45	1.00-2.10	1.55	1.07-2.24	1.50	1.04-2.17
Age						
>20	Ref	Ref	Ref	Ref	Ref	Ref
20-30	1.64	0.55-4.93	1.66	0.56-4.92	1.79	0.60-5.30
31-40	2.99	0.96-9.39	3.21	1.04-9.93	3.34	1.08-10.35
>40	3.03	0.79-11.69	2.80	0.74-10.67	3.41	0.90-12.93

Table 3

Multivariate regression models of psychopathologic symptomology and neck pain among 900 respondents in Southwest Ethiopia

	Depression		Anxiety		PTS	
	OR	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Depression						
no	Ref	Ref				
yes	4.92	2.49-9.74				
Anxiety						
no			Ref	Ref		
yes			2.67	1.41-5.09		
PTS						
no					Ref	Ref
yes					1.80	0.8-4.02
Gender						
male	Ref	Ref	Ref	Ref	Ref	Ref
female	2.06	1.01-4.19	1.93	0.95-3.91	1.96	0.94-4.05
Asset Index						
high	Ref	Ref	Ref	Ref	Ref	Ref
low	1.72	0.92-3.23	1.87	1.01-3.50	1.85	0.99-3.44
Age						
>20	Ref	Ref	Ref	Ref	Ref	Ref
20-30	1.72	0.22-13.46	1.76	0.23-13.57	1.88	0.25-14.41
31-40	2.27	0.27-18.79	2.59	0.32-21.04	2.8	0.35-22.80
>40	3.57	0.34-37.40	3.44	0.3435.25	4.15	0.41-42.40