DEPRESSION IN PAKISTAN: AN EPIDEMIOLOGICAL CRITIQUE

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ABSTRACT

The epidemiological studies from Pakistan have given rise conflicting findings. Besides very high prevalence in different studies, rates from Northern Pakistan are much different from big urban centre such as Karachi. If the findings of these studies are to be taken at face value than every third Pakistani is expected to be suffering from depression and Anxiety. Obviously this has serious implications for the country's mental health care scenario. There are design, sampling and methodological issues which needs to be revisited. This review aims to This review presents a critique, from an epidemiological perspective, on studies carried out in Pakistan on estimating rates and risk factors of depression. It is expected that this critique will serve to enhance awareness on research methods in psychiatry and suggest future directions for research in this important area.

Key words: Depression, Psychiatric Epidemiology, Pakistan.

INTRODUCTION

Psychiatric Epidemiology is a discipline that deals with methodological issues of measurement, i.e. case definition and case identification, psychometric properties, study design and samples, and theoretical models of environment and genetic origins of psychopathology. This review presents a critique, from an epidemiological perspective, on studies carried out in Pakistan on estimating rates and risk factors of depression. It is expected that this critique will serve to enhance awareness on research methods in psychiatry. A general discussion on various measures of disease morbidity is firstly presented followed by specific critique on epidemiological evidence on depression in Pakistan. This may appear too basic but will help to put the findings in context.

Measures of Disease Morbidity

In epidemiology, the most important tool for measuring disease is the rate, but ratio and proportions are also used. A *ratio* expresses the relationship between two numbers in the form x:y or x/y X k. A *proportion* is a specific type of ratio in which the numerator is included in the denominator, and the resultant value is expressed as a percentage. A rate is a special form of proportion that includes specification of time. The rate is the basic measure of disease occurrence because it is the measure that most clearly expresses probability or risk of disease in a defined population over a specified period of time.[1]

In order to calculate rate, we must be able to count accurately all events of interest that occur in a defined population during a specific period of time. A number of different rates of morbidity, or illness, are used in public health and epidemiology. All fall into two basic types, rates of incidence and rates of prevalence.

Incidence rates measure the probability that healthy people will develop a disease during a specific period of time; hence, it is the number of new cases of a disease in a population over a period of time. Incidence rates are a measure of probability or risk of disease (conditional on the individual's not dying from any cause). Risk can vary from zero to one, is dimensionless, and requires a specific period referent. The most common way to estimate risk is to divide the number of newly detected cases that developed during follow-up by the number of disease-free subjects at the start of follow-up; a proportion called as cumulative incidence (CI).[1] Importantly, determination of date of onset is necessary for studies of incidence. For some events, this determination is relatively simple. The onset of influenza, acute myocardial infarction, gastroenteritis can often be pinpointed to specific hour. However, this is not true of certain psychiatric conditions, whose onset may be insiduous and difficult to define..

The *Prevalence* rate measures the number of people in a population who have the disease at a given time. Prevalence measures the probability of people having a disease at a given point in time (more specifically termed as point prevalence). Prevalence depends on two factors: the number of people who have been ill

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in the past (i.e. previous incidence) and the duration of the illness. The relation of prevalence (P) to both incidence (I) and duration (d) of disease is expressed in the formula P ~ I x d, which states that prevalence varies directly with both incidence and duration.[1]

In contrast to incidence, high prevalence does not necessarily signify high risk; it may merely reflect an increase in survival, thus giving a biased picture. This difference is crucial to an understanding of screening programs. The first screening of a population picks up prevalent as well as incident cases of disease. Re-screening detects only incident cases (i.e. those that developed between the first and subsequent screens). It is important to remember that cross-sectional surveys (even if repeated over some time) do not constitute a longitudinal study and, therefore, do not permit etiological inference or estimates of changes in risk of disease over time.

Reliability: Kappa Statistics

Kappa quantifies the extent to which the observed agreement that the observers achieved exceeds that which would be expected by the chance alone, and expresses it as the proportion of the maximum improvement that could occur beyond the agreement expected by chance alone. It can be defined in an equation:

Kappa = (Percent agreement observed) – (Percent agreement expected by chance alone)

100% - (percent agreement expected by chance alone)

For example, if two psychiatrist are asked to assess 50 patients for probable depressive disorder. Each psychiatrist will classify individual case as depressed or not-depressed or Normal (For the sake of clarity we will assume that individual patient has no other comorbidity). Following 2x2 can be constructed:

Agreement between two psychiatrists: 16+ 28/50 = 88%

For A Depressed = 18/50 = 0.36,

For B Depressed = 20/50 = 0.40

Agreement expected by chance for depression = 0.36x 0.40= 0.144

For A Normal 32/50= 0.64, For B Normal 30/50 = 0.6

Agreement expected by chance for normal = 0.64x0.6 = 0.384

Table 1: Prevalence of depression from community studies in Pakistan

Site	Females	Males
North Pakistan[7]	46%	15%
Rural Punjab[6]	66%	25%
Urban Karachi[2]	57.5%	25.5%
Semi-Urban Karachi[3]	42.2%	18.1%
Urban Punjab[5]	25%	10%

Total chance agreement = 0.144+0.384= 0.528

Kappa=P0_Pc/1-Pc K=0.88–0.528/1–0.528=0.75.

P0= Observed agreement K < 0.4, Poor agreement

Pc= Agreement expected by Chance 0.4 – 0.75, Moderate agreement; 0.75 or > very good to excellent.

Validity Issues: Sensitivity and specificity

Strength of studies carried out by Mumford et al is two stage screening method. In their initial assessment they have screened the population using screening instrument (Bradford Somatic inventory - BSI) for depression followed by a structured psychiatric interview (Present State Examination- PSE-9). There are some issues (strengths and weaknesses) in choice of sequential use of two screening instruments. In sequential screening only those patients, who score positive on the first stage, are enrolled for further tests. Those who score negative on the test might have a disease and are liable to be misclassified, given the specific validity of the screening instrument. An evaluation of those who score negatively on the test, although some what expensive, is likely to give an indication of this misclassification. Sequential use of two instruments, however, increases the net specificity. In sequential or two-stage screening, a less expensive, less invasive or less uncomfortable test is generally performed first, and those who screen positive are recalled for further testing with a more expensive, more invasive, or more uncomfortable test, which may have greater sensitivity and specificity. It is expected that bringing back those who test positive, for further testing, will reduce the problem of false positive. However this will result in loss of sensitivity at the cost of increase in specificity.

In order to understand it further, considers a hypothetical example; if disease prevalence in a study is given as 30%, so that in the population of 10,000, 3000 persons have the disease. With a sensitivity of 70%, the test will correctly identify 2100 of the 3000 people who have the disease. With a specificity of 80%, the test will correctly identify as non-depressed (Normal) 5600 of the 7000 people who are free of depressive disorders; however 1400 of these 7000 will have positive results. Thus a total of 3500 people will test positive and will be brought back for a second test.

Now those 3500 people are brought back and screened using a second test (such as PSE), which for

	Psychiatrist 'A'		
PSYCHIATRIST 'B'	Depressed	Normal	
Depressed	16	4	20
Normal	2	28	30
	18	32	50

purpose of this example is assumed to have a sensitivity of 90% and a specificity of 90%. 2x2 table shows that test 1 together with test 2, which deal only with 3500 people who tested positively in the first screening test and have been brought back for second-stage screening. Since 2100 people (of the 3500) have the disease and test has a sensitivity of 90%, 1890 of those 2100 will be correctly identified as positives. Because 1400 (of the 3500) do not have depression and the test specificity is 90%, 1260 of the 1400 will be correctly identified as negative and 140 will be false positives. We can now calculate the net sensitivity and the net specificity of using both tests in sequence.

Example: Assume; Disease Prevalence = 30%, Population = 10,000
Test 1: (screening questionnaire for Depression)
Sensitivity; 70%, Specificity; 80%

	Depression positive	Depression Negative	
Test Positive	2100	1400	3500
Test Negative	900	5600	6500
	3000	7000	10,000

Test 2 (structured interview)

Sensitivity; 90%, Specificity 90%

DEPRESSION

	Depression positive	Depression Negative	
Test Positive	1890	140	2030
Test Negative	210	1260	1470
	2100	1400	3500

Net sensitivity = 1890/3000 = 63%
Net specificity = 5600 + 1260/ 7000 = 98%

Prevalence Estimates of Depression and Anxiety from Pakistan

There are five community based studies reporting prevalence estimates for Depression and Anxiety from various regions of Pakistan (See table 1). These studies give variable prevalence estimates of Depression; from as high as 66% in women from rural areas to 10% in men from urban areas. The mean overall point prevalence is 33.62% (n=2658).[2] These hand full of studies, along with few other center based studies, comprises the epidemiological evidence for Common mental disorders from Pakistan.

A critical re-evaluation of these studies is required given the variability of findings. There are design, sampling and methodological issues which needs to be revisited. If the findings of these studies are to be taken at face value than every third Pakistani is expected to be suffering from depression and Anxiety. Obviously this has serious implications for the country's mental health care scenario. Rates from Northern Pakistan are much different from Karachi. Is this an artifact or the low rates of depression and anxiety from Karachi could be ascribed to the systematic error of center based sampling methodology?

Prevalence Rates from Karachi:

In a study carried out in semi-urban squatter settlements of Azam Basti, Karachi, Ali (2000) reported an apparent prevalence (proportion) of 30% in study population. Crude estimates for males were 18.1% and for females 42.2%[3]. Absence of age-adjusted rates and lack of validated screening instruments raise certain methodological issues. The participants were interviewed by four Consultant Psychiatrists on weekends. Diagnosis was based on DSM-III R criteria. Authors made no mention of inter-rater reliability or the level of agreement among the group. Lack of either screening instrument or a structured interview brings the issue of case ascertainment in to question. The literature during 1980s and 90s is replete with references, to the lack of reliability in clinical judgment when using the categorical approach for case definition.

Other methodological limitation of this study is that only those individuals were included who could understand the National Language, Urdu. This could have a major *selection bias* as Azam Basti is an area which has large number of immigrants. These people are not expected to be fluent in Urdu. Azam Basti, like other field sites of Department of Community health Sciences, Aga Khan University Hospital is a semi-urban squatter settlement. Squatter settlements like Azam Basti, Hijrat Colony, and Bilal Colony cater to large influx of immigrant population from various parts of the country. In a recent random house hold survey of Bilal colony (n=425), 40% were identified to be Punjabi, 27% Pathans, 16% Sindhis and 9% Urdu speaking.[4] According the last census 22.1% of the Karachi city's population are migrants from other places. Therefore study by Ali gives prevalence rates in a selected sub-group of Urdu speaking population residing in the semi-urban squatter settlement.

Another selection-bias was the recruitment of only those patients who could attend the primary health care center. Author describes this limitation as "a randomized house hold survey could not be conducted as most of the households had only one or two rooms and taking permission to enter the house holds and ensuring privacy could not be arranged".[3] However, from an epidemiological point of view, the denominator of proportions and rates may not be population in the usual sense.

Prevalence rates from Northern Pakistan:

Another series of paper by Mumford et al describes the prevalence estimates for depression and anxiety

from Northern Punjab. The apparent point prevalence of depression from Urban Rawalpindi was found to be 25% for women and 10% for men.[5] In another study, using a similar methodology, the prevalence estimate from rural community setting of Rawalpindi was 57.5% for women and 25.5% for men.[6] One of the limitations in the analysis phase of the study and subsequent presentation is absence of age cutoff for geriatric population. Authors reported the prevalence estimates on any subject older than eighteen.[6] It is well known that prevalence estimate for many illnesses increases with the age besides the presenting features of the illness. Similarly a much higher estimate was found by the same author from mountainous region of Chitral in Northern Pakistan. Depression was estimated to be 25% to 72% among women and 10% to 44% among men.[7]

The wide variation in estimates raises certain validity issues of screening tests. Validity of any test or screening instrument is defined as its ability to distinguish between who has a disease and who does not. Validity is a component of sensitivity and specificity of a test. Next section addresses these issues from an epidemiological point of view.

Establishing causality: Risk factors for Depression

In order to determine antecedents of disease, it is necessary to establish a time sequence and show that presumed independent variable(s) antecede the dependent one. Such temporal relationship can not be established by cross sectional data[8]. It is important to keep this limitation in mind because it is tempting to use prevalence data for causal inference, since they are more readily obtained than incidence data. So how do we determine whether a certain disease is associated with a certain exposure? To determine whether such an association exists, we must determine, using data obtained in case-control and cohort studies, whether there is an excess risk of the disease in persons who have been exposed to certain agents as opposed to risk in unexposed population.

Review of studies carried out on depression in Pakistan shows that all are cross sectional studies in design. These studies report various risk factors for depression in studied population. Some are congruent to studies in the west while other gives contrary evidence. Rates for depressive disorder are reported to be higher in women than men. This is consistent with the estimates from western countries. However one disparity that is observed is significantly higher rates in married than single females. Literature, from western countries, considers marriage to be a protective factor. It can be hypothesized that there are socio-cultural stressors specific to Pakistani culture that renders married females vulnerable to depression. One can ask; is this factual or an artifact of measurement?

In a cross sectional study carried out by Ali and Naeem in urban middle class population of Karachi, looking specifically at the psychosocial risk factors, found extended family systems to be a particular risk factor[9]. However findings from Northern Punjab are contradictory[6]. It reports extended family networks as a protective factor for married females. Other reported risk factors for depression from Pakistan are low level of education, poverty and economic constraints.

Landmark study by social scientists from U.K (Brown and Harris, 1978) reports emotional burden of child-care, non confiding relation with husband and non-professional status (having no job outside the home) as vulnerability factor for depression among females[10]. In an earlier study (Naeem S) these risk factors were replicated besides the stressor of hostile in-laws. [11] Contrarily studies from Northern Punjab reports that risk factors identified by Brown and Harris in London do not seem to apply for women in Punjab.

Another identified risk factor for Depression is socio-economic status. It is a complex concept that has been borrowed by medical researchers, often without due regard to its sociological inheritance. In epidemiology the concept is assessed indirectly using a variety of different measures with different implications for social and economic policy. Income, material possessions (or standard of living), occupational status, and education are the domains most commonly studied.[12] Nevertheless, these measures are not equivalent and might have different meanings and represent different concepts of social position in different cultures. For instance, income changes throughout life while education remains comparatively "frozen" after early adulthood and educational attainments can have different meaning in different places. The association between relative or absolute income and health is among the most commonly reported in the scientific literature. However, recent studies from western countries, using robust deigns, have found that this association is weakened or disappear when controlling for other socioeconomic variables, especially education.[13]

In conclusion all of the studies carried out in Pakistan were cross sectional in design. Given the limitation of the study design, it remains unclear what exposure acts as a risk factor for depression. Univariate and covariate analysis of data can give putative risk factors which can be subsequently tested using multivariate regression analysis. However, one need to be careful, regression analysis has its limitation in handling complicated data. In order to build a model one needs adequate sample per variable (at least 10) besides the significance and sequence of individual variables, which have a bearing on the final model of regression analysis[14]. Longitudinal studies need to be carried out in order to establish robust evidence on incidence and risk-factors of depression in Pakistan.

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Tutorial in JPPS

Tutorial is a new feature in JPPS. It aims to provide a simple and concise explanation of epidemiology and statistics in the context of current literature. We aim to provide an understanding of the research issues for busy clinicians. We will prefer and welcome the articles which discuss the findigns of research conducted in Pakistan or other developing countries.