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The prevalence of non-communicable disease risk factors in community-living patients with psychiatric disorders: A study from North India

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ABSTRACT

Objective: Screening for non-communicable disease (NCD) risk factors can help in prevention or reduction in the ill-effects of NCDs. Data on NCD risk factors in community-dwelling patients with common mental disorders (CMD) is lacking. This study was designed to screen for selected NCD risk factors in patients attending a community psychiatry service (CPS) in the states of Punjab and Haryana in North India.

Methods: Following ethical clearance, the study was conducted in 4 satellite clinics of the CPS of a tertiary hospital from North India. Consecutive adult patients were approached and 719 patients were assessed. A one-time cross-sectional assessment was carried out which included socio-demographic data, clinical details, history of tobacco and alcohol use, personal history of hypertension and diabetes, family history of diabetes, prevalence of hypertension, obesity (central and generalised) and levels of physical activity.

Results: 302 males and 417 females were assessed. Most patients were diagnosed with CMD. The prevalence of hypertension was 42.7% in males and 34.1% in females. The prevalence of central and generalised obesity in males and females was 41.4%, 71.2% and 34.8%, 45.6% respectively. 32.5% of males and 40.2% females were assessed to be inadequately physically active.

Conclusions: The results of the study suggest that there is high prevalence of NCD risk factors in patients with CMD. Hypertension is more common in males while obesity and inadequate physical activity is more common in females. NCD risk factor screening and management, health education should be integrated in CPS.

1. Introduction

There is ample evidence to suggest that patients with severe mental illness (SMI) have a greater burden of non-communicable diseases (NCD) especially cardiovascular (CV) morbidity and mortality (Correll et al., 2017). The mechanisms by which this occurs are likely to be complex and multifactorial (Henderson et al., 2015). NCDs usually take years to develop and thus provide an opportunity for screening and intervention. Screening can be most readily done by the identification of risk factors and subsequent intervention. For instance, modifiable CV risk factors such as hypertension, physical inactivity etc that are used to generate cardiovascular risk profiles are commonly used across a variety of situations to improve patient care (Graham, 2006). A risk factor is any attribute, characteristic or exposure of an individual that increases the likelihood of developing a disease ("WHO | Risk factors,", 2019). The common risk factors that are usually identified include factors such as socio-demographic profile, alcohol and tobacco use, physical activity, history of diabetes and hypertension and other cardiovascular diseases, generalised and central obesity among others (Riley et al., 2016). Evidence suggests that there is increased prevalence of these NCD and CV risk factors in patients with SMI (Foguet-Boreu et al., 2016).

It is also worthwhile to mention that the prevalence of CV morbidity and mortality among the general population in India is amongst the highest in the world (Prabhakaran et al., 2016). Data regarding common CV risk factors in the general population shows high prevalence of CV risk factors such as hypertension, obesity and physical activity (Anchala et al., 2014; Anjana et al., 2014; Pradeepa et al., 2015). With respect to mental illness and NCD in India, a review of literature reveals the following. Most studies have dealt with prevalence of diseases such as coronary artery disease in patients with mental illness such as depression rather than examining the risk factors (Dhar and Barton, 2016). The other category of studies has focussed on the prevalence of metabolic syndrome in the mentally ill (Mattoo and

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Singh, 2010). These studies have usually had small sample sizes, have been conducted in tertiary care settings and focussed on in-patients and on those with SMI (Hussain et al., 2017).

Psychiatric disorders including the milder, non-psychotic presentations of depression and anxiety disorders usually classified together as common mental disorders (CMD) have a higher prevalence than SMI and cause significant burden on society (Steel et al., 2014). This population is usually community dwelling, morbidity in them is under-recognized and they are under-served by conventional health service mechanisms (Steel et al., 2014). However, a review of literature suggests that this population is relatively neglected with respect to data regarding prevalence of CV risk factors.

The above review suggests that there is a lack of data regarding NCD risk factors in community dwelling patients with predominant CMD. Considering the lacunae in existing literature, the present study was designed and conducted to study the prevalence of selected NCD risk factors with emphasis on CV risk factors in a population of community-living, treatment seeking, CMD predominant patients and add to the evidence base in this area.

2. Material and methods

The study protocol was approved by the institute ethics committee. The study was conducted over 2017-2018.

Setting: The study was carried out in weekly satellite clinics of the community psychiatry service (CP) of the Department of Psychiatry of a tertiary hospital in North India. This service is manned by psychiatrists and a psychiatric social worker. The clinics are run at the civil hospitals in Raipur Rani and Naraingarh in the state of Haryana; Kharar in Punjab and the primary health centre in Nandpur Kalor which is a village in Fathegarh Sahib district of Punjab. All these locations are within 50 km of Chandigarh and cater to a predominantly rural population. Most of these people did not have access to formal psychiatric services until recently. However some of them had been on treatment from various practitioners for varying lengths of time. The patients attending these clinics are voluntary or are referred by other doctors in the hospitals. Some patients attending the department in Chandigarh are also referred to the CP for management closer to their place of stay.

2.1. Participants

Adult patients ≥18 years of age and of either gender were approached for entry into the study after obtaining written informed consent.

Sample size and sampling technique: We calculated sample size on basis of published reports of prevalence of hypertension. A sample size of 384 was calculated on basis of conservative estimated prevalence of hypertension at 20% (Anchala et al., 2014; Pourhoseingholi et al., 2013). The average number of patients seen over a period of one year is about 1000. Thus it was decided to approach consecutive new registrants until the targeted sample size was achieved. We were able to assess 719 patients for this study.

2.2 Instruments and parameters: The following data were collected.

a Socio-demographic details were collected as per the profile sheet usually used in the department.
b Clinical details including psychiatric diagnosis, duration of symptoms, treatment and duration of treatment were recorded. This was done on basis of clinical interview of the patient. In addition personal history and levels of alcohol and tobacco use if applicable, personal history of diabetes or hypertension and family history of diabetes and hypertension were enquired into and recorded. CMD were defined as all psychiatric disorders included in the categories of 'mood disorders' and 'neurotic, stress-related and somatoform disorders' of the ICD-10 (Ormel et al., 1994; Patel and Kleinman, 2003).
c Anthropometric details included blood pressure using an electronic Omron sphygmomanometer to the nearest 1 mm Hg; weight measured using a portable weighing scale; hip and waist circumference were measured using a non-stretchable measuring tape. Height was measured using a non-stretchable measuring tape fixed to a vertical wall with a right angle block to determine the level of the top of the head. As this was a naturalistic survey, we used measuring instruments available at the point of care. However due diligence was exercised to record all measurements as per the World health organisation norms (Luepker et al., 2004). All the measurements and recording of the data of each patient was made by a junior doctor posted in the CP service on that particular day. We did not formally test for inter-rater reliability due to pragmatic reasons. However all the doctors involved in the measurement are trained in the procedures used for as a part of their training. Hypertension was defined as diastolic or systolic blood pressure (BP) ≥90 mm Hg and ≥140 mm Hg respectively ("Hypertension (High Blood pressure) | National Health Portal Of India,", 2019). Body mass index (BMI) was calculated using the height and weight and defined as per Indian norms (Misra et al., 2009). Central obesity was assessed on basis of the waist circumference and classified as per accepted norms (Alberti et al., 2006).
d Physical activity was measured using the Global physical activity questionnaire (GPAQ) (Bull et al., 2009). Inadequate physical activity was defined as < 600 met-minutes using existing guidelines (Anjana et al., 2014).

Every adult patient attending the CP was approached for entry into the study. Written informed consent was taken from all those who agreed. All participants were evaluated only once for the purposes of this study. General health advice and appropriate referrals were made wherever required.

3. Results

A total of 719 patients (302 males and 417 females) participated in the study. The results were analysed with appropriate statistical tests. Table 1 presents the sociodemographic profile and the treatment status at assessment. Significantly more females were illiterate as compared to males. About 60% patients were treatment naive at the time of assessment. Most of the males were involved in agriculture and females were homemakers. CMD was the most common group of psychiatric diagnoses in both males and females. There was a wide variation in the duration of symptoms in both genders. However the mean duration was 18.41 weeks in males and 11.69 weeks in females. Table 2 presents the alcohol, tobacco use and history of diabetes or hypertension and family history of diabetes in the participants. There were significantly more males than females using alcohol and tobacco. This is in keeping with the socio-cultural context of the area in which the study was carried out. About quarter of patients were aware of being diagnosed with either hypertension on diabetes or both. About 5% patients were aware of having the family history of diabetes in a first degree relative. Table 3 presents the results of the anthropometric data and the GPAQ scores. The anthropometric derived data include the diastolic and systolic blood pressure, hypertension, central obesity and obesity. We found that the contribution of recreational physical activity as compared to that by work related activities to GPAQ scores was minimal in both males and females.

Table 4 presents the anthropometric data and the GPAQ scores when compared across the CMD versus the non-CMD diagnostic groups.

4. Discussion

This study was conducted in two rural areas each of Punjab and Haryana states of North India which are amongst the states that rank the highest with regards to Human development index in the country

Table 1
Sociodemographic and treatment profile of study population.

	Age			Prevalence of CMD		Prevalence of Illiteracy		Treatment naive at assessment	
	Category in years	N (%)	Pearson Chi-square	N (%)	Pearson Chi-square	N (%)	Pearson Chi-square	N (%)	Pearson Chi-square
Male	18-45	148 (54.3)	0.02	104 (70.2)	0.13	6 (4.1)	p < < 0.05	91 (61.5)	0.46
	46-60	97 (32.1)		76 (78.3)		19 (19.6)		55 (56.7)	
	> 60	57 (18.9)		47 (82.4)		13 (22.8)		38 (66.7)	
	Total	302 (42)		227 (75.2)		38 (12.6)		184 (60.9)	
Female	18-30	241 (57.7)		218 (90.4)	0.84	29 (12.0)	p < < 0.05	142 (58.9)	0.15
	46-60	123 (29.5)		113 (91.8)		44 (35.8)		61 (49.6)	
	> 60	53 (12.7)		49 (92.4)		31 (58.5)		26 (49.1)	
	Total	417 (58)		380 (91.1)		104 (24.9)		229 (54.9)	
	Overall total	719		607 (84.4)	0.39	142 (19.74)	p < < 0.05	413 (57.4)	0.22

[P] significant when < 0.05.

Table 2
Tobacco and alcohol use, hypertension and diabetes status and known family history of diabetes.

	Tobacco use		Alcohol use		Known Hypertension (HTN), Diabetes (DM), Coronary artery disease (CAD)		Family history of diabetes in first degree relative
	Categories	N (%)	Categories	N (%)	Prevalence	N (%)	Prevalence N (%)
Male	Ever used	21 (7.0)	Ever used	49 (16.2)	HTN	51 (16.9)	15 (5)
	Current use	71 (23.5)	Current use	51 (16.9)	DM/CAD ± HTN	19 (6.3)	
	Total	92 (30.4)		100 (33.1)		70 (23.1)	
Female	Ever used	4 (1.0)	Ever used	4 (1)	HTN	71 (17.0)	23 (5.5)
	Current use	6 (1.4)	Current use	9 (2.2)	DM/CAD ± HTN	23 (5.5)	
	Total	10 (2.3)		13 (3.1)		94 (22.5)	
Overall total		102 (14.2)		113 (15.7)		164 (22.8)	38 (5.3)

Table 3
Prevalence of anthropometric derived variables and level of physical activity.

		Prevalence of Hypertension N (%)	chi-square p value	Prevalence of Central obesity N (%)	chi-square p value	Prevalence of Generalised Obesity (BMI > 25)	chi-square p value	inadequate activity (MET < 600)	chi-square p value
	Category in years								
Males	18-45	51 (34.4)	p = 0.04	44 (29.8)	p < < 0.05	51 (34.5)	p = 0.06	48 (32.4)	0.86
	46-60	49 (50.5)		52 (53.6)		34 (35.1)		30 (30.9)	
	> 60	29 (50.8)		29 (50.8)		20 (35.1)		20 (35.1)	
	Total	129 (42.7)		125 (41.4)		105 (34.8)		98 (32.5)	
Females	18-45	68 (28.2)	p < < 0.05	160 (66.4)	p = 0.01	95 (39.4)	p < < 0.05	81 (33.6)	p < < 0.05
	46-60	58 (47.1)		100 (81.3)		77 (62.1)		60 (48.8)	
	> 60	16 (30.2)		37 (69.9)		18 (33.9)		27 (50.9)	
	Total	142 (34.1)		297 (71.2)		190 (45.6)		168 (40.2)	
Overall total		271 (37.7)	p < < 0.05	422 (58.7)	p < < 0.05	295 (41.1)	p < < 0.05	266 (36.9)	0.01

[P] significant when < 0.05.

(Sharma, 2013). Thus the study population was likely to have better indicators of health and development. This study was a naturalistic assessment of CV risk factors in a treatment-seeking, ambulatory population from a predominantly rural background. There were more females than males in the study population. More than half of the participants of either gender were in the 18–45 years age group. A majority of participants were diagnosed with CMD in both genders and about half were treatment naive at assessment. There was significantly more illiteracy in the older age groups and also in the females as compared to the males. Thus the study population was representative of the patients that are usually seen in this service. The age composition of the study population was similar to other surveys with regards to prevalence of hypertension done elsewhere in India (Anchala et al., 2014). Another important implication is that the duration of symptoms and treatment naive status in about half the patients indicates that it is unlikely that the NCD risk factors detected were associated with psychotropic medication use. The prevalence of reported alcohol and tobacco use was broadly similar to that reported elsewhere. The wide differential between reported alcohol and tobacco use in males and females is typical of the socio-cultural context in which this study was carried out (Rani et al., 2003; Rathod et al., 2015). Our figures may have been underestimates given that we did not use any standardised questionnaire, or corroborate the information with other informants or test for biochemical parameters. However these figures do suggest a widespread prevalence of alcohol and tobacco use among males and their attendant health outcomes in our study population. Less than half of those who screened positive for NCD risk factors were aware of their hypertension or diabetes status. This shows that screening is essential given the high prevalence and low levels of knowledge regarding presence of illness. About a quarter of patients were aware of a family history of hypertension and/or diabetes. This indicates the high genetic and environmental predisposition to these diseases in our study

Table 4
Comparison of prevalence of anthropometric derived variables and level of physical activity across CMD and non-CMD diagnostic groups.

	Prevalence of Hypertension (%)	N	chi-square p value	Prevalence of Central obesity (%)	N	chi-square p value	Prevalence of Generalised Obesity (BMI > 25)	chi-square p value	inadequate activity (MET < 600)	chi-square p value
CMD	36.57		0.07	62.10		p < < 0.05	42.83	p < < 0.05	36.57	0.32
Non-CMD	43.57			40.17			31.25		39.28	

[p] significant when < 0.05.

population and also awareness and knowledge of these disorders which may translate into more acceptability of treatment and better hypertension and glycemic control among the patients.

The high prevalence of NCD risk factors and early mortality in people with SMI is a cause of concern (DE Hert et al., 2011). While there is data regarding the prevalence of CMD in patients presenting to primary care, there is limited data regarding the NCD risk factors in community dwelling, ambulatory patients with predominant diagnosis of CMD (Wittchen et al., 2003). Cardiac morbidity is the end result of a host of factors in which hypertension, obesity and physical inactivity play an important part. As reviewed elsewhere, patients with major depression have a higher prevalence of cardiac diseases and associated mortality (Khawaja et al., 2009). Our study indicates that there is a high prevalence of hypertension in both males and females. Across both genders, the prevalence of hypertension was greater in the older age groups. In females, there was a high prevalence of hypertension in the middle aged age group which is usually considered less vulnerable to cardiac morbidity. Males had significantly more hypertension than females in our population. In the age group of 46 years and above, more than half of all males were found to be hypertensive. Our results indicate that the prevalence of hypertension in our study population was higher that seen in the general population. For instance, a recent meta analysis computed the prevalence of hypertension in rural North India to be 14.5% and the national average to be 29.8% (Anchala et al., 2014). Our results were closer to that reported in another large study conducted in North India that found the prevalence of hypertension to be 40.1% with a preponderance in older males as compared to females (Tripathy et al., 2017).

The prevalence of obesity was also much higher than that revealed in epidemiological surveys. A recent study examined the prevalence of obesity in rural and urban populations in India. This study revealed that the prevalence of generalised obesity (BMI ⩾25) and central obesity (waist circumference) in rural Chandigarh (which is geographically close to the study area) was 27.9% and 32.1% respectively (Pradeepa et al., 2015). In contrast to this study we also found that the prevalence of generalised and central obesity was statistically greater in females as compared to men. Among females, generalised obesity was greatest in the 46–60 age group whereas it was similar across age groups in males. Central obesity also showed an increasing prevalence with increasing age in males and females.

With regards to physical activity as reflected by the GPAQ questionnaire, we could compare our results with an epidemiological study carried out across four regions of India (Anjana et al., 2014). We found comparable levels of inactivity as the general population in Chandigarh and also statistically higher levels of inactivity in females as compared to males. Similar to this study we found that with increasing age, the prevalence of inadequate levels of activity increased in females as compared to men. Our study indicates that physical activity is given less priority than is otherwise desirable.

We found that in our study sample patients with CMD had comparable (hypertension and physical inactivity) or in the case of generalised and central obesity, greater prevalence of NCD than those with non-CMD patients. This indicates that NCD risk factors are equally represented in patients with CMD and not just in non-CMD populations as is commonly believed. This indicates that morbidity and mortality arising from NCD is likely to be equally if not more important in patients with CMD. This is especially so considering the absolute numbers involved.

The results of our study show that ambulatory patients with predominant CMD have a higher or comparable NCD risk factor burden than the general population. Patients with mental illness are usually disadvantaged as compared to other health care seeking populations and needs other than mental health services may be neglected. This is because of lack of resources, barriers to health care seeking, poor awareness of mental health conditions and compartmentalisation of services. This reflected in the immense treatment gap with regards to

mental illness treatments that exists in India (Sagar et al., 2017). Our study shows that in addition to the need for bridging the mental health treatment gap, there is also a gap in care for the physical health of people with mental health conditions in the community. Screening of patients with CMD for NCD risk factors should be an essential component of any mental health service. The study also underlines the importance of health education with regards to importance of healthy lifestyles and adequate importance to exercise and weight control.

The strengths of our study include the robustness of sample size and the naturalistic setting in which it was carried out. The limitations include a cross-sectional assessment, that we did not carry out the measurements in laboratory conditions, the lack of assessment of other risk factors such as diet and socioeconomic status and the inability to carry out biochemical assessments for metabolic abnormalities.

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Conflict of interest

None of the authors have any conflict of interest to report

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None

References

Alberti, K.G.M.M., Zimmet, P., Shaw, J., 2006. Metabolic syndrome–a new world-wide definition. A consensus statement from the international diabetes federation. Diabet. Med. J. Br. Diabet. Assoc. 23, 469–480.

Anchala, R., Kannuri, N.K., Pant, H., Khan, H., Franco, O.H., Di Angelantonio, E., Prabhakaran, D., 2014. Hypertension in India: a systematic review and meta-analysis of prevalence, awareness, and control of hypertension. J. Hypertens. 32, 1170–1177.

Anjana, R.M., Pradeepa, R., Das, A.K., Deepa, M., Bhansali, A., Joshi, S.R., Joshi, P.P., Dhandhania, V.K., Rao, P.V., Sudha, V., Subashini, R., Unnikrishnan, R., Madhu, S.V., Kaur, T., Mohan, V., Shukla, D.K., ICMR– INDIAB Collaborative Study Group, 2014. Physical activity and inactivity patterns in India - results from the ICMR-INDIAB study (Phase-1) [ICMR-INDIAB-5]. Int. J. Behav. Nutr. Phys. Act. 11, 26.

Bull, F.C., Maslin, T.S., Armstrong, T., 2009. Global physical activity questionnaire (GPAQ): nine country reliability and validity study. J. Phys. Act. Health 6, 790–804.

Correll, C.U., Solmi, M., Veronese, N., Bortolato, B., Rosson, S., Santonastaso, P., Thapa-Chhetri, N., Fornaro, M., Gallicchio, D., Collantoni, E., Pigato, G., Favaro, A., Monaco, F., Kohler, C., Vancampfort, D., Ward, P.B., Gaughran, F., Carvalho, A.F., Stubbs, B., 2017. Prevalence, incidence and mortality from cardiovascular disease in patients with pooled and specific severe mental illness: a large-scale meta-analysis of 3,211,768 patients and 113,383,368 controls. World Psychiatry 16, 163–180.

DE Hert, M., Correll, C.U., Bobes, J., Cetkovich-Bakmas, M., Cohen, D., Asai, I., Detraux, J., Gautam, S., Möller, H.-J., Ndetei, D.M., Newcomer, J.W., Uwakwe, R., Leucht, S., 2011. Physical illness in patients with severe mental disorders. I. Prevalence, impact of medications and disparities in health care. World Psychiatry Off. J. World Psychiatr. Assoc. WPA 10, 52–77.

Foguet-Boreu, Q., Fernandez San Martin, M.I., Flores Mateo, G., Zabaleta del Olmo, E., Ayerbe García-Morzon, L., Perez-Piñar López, M., Martin-López, L.M., Montes Hidalgo, J., Violán, C., 2016. Cardiovascular risk assessment in patients with a severe mental illness: a systematic review and meta-analysis. BMC Psychiatry 16.

Graham, I.M., 2006. The importance of total cardiovascular risk assessment in clinical practice. Eur. J. Gen. Pract. 12, 148–155.

Henderson, D.C., Vincenzi, B., Andrea, N.V., Ulloa, M., Copeland, P.M., 2015. Pathophysiological mechanisms of increased cardiometabolic risk in people with schizophrenia and other severe mental illnesses. Lancet Psychiatry 2, 452–464.

Hussain, T., Margoob, M.A., Shoib, S., Shafat, M., Chandel, R.K., 2017. Prevalence of metabolic syndrome among psychiatric inpatients: a hospital based study from Kashmir. J. Clin. Diagn. Res. JCDR 11, VC05–VC08.

Hypertension (High Blood pressure), 2019. National Health Portal Of India. [WWW Document], n.d. URL https://www.nhp.gov.in/disease/cardio-vascular/hypertension-high-blood-pressure (Accessed 11.16.18).

Khawaja, I.S., Westermeyer, J.J., Gajwani, P., Feinstein, R.E., 2009. Depression and coronary artery disease. Psychiatry Edgmont 6, 38–51.

Luepker, R.V., Evans, A., McKeigue, P., Reddy, K.S., 2004. Cardiovascular Survey Methods.

Mattoo, S.K., Singh, S.M., 2010. Prevalence of metabolic syndrome in psychiatric inpatients in a tertiary care centre in north India. Indian J. Med. Res. 131, 46–52.

Misra, A., Chowbey, P., Makkar, B.M., Vikram, N.K., Wasir, J.S., Chadha, D., Joshi, S.R., Sadikot, S., Gupta, R., Gulati, S., Munjal, Y.P., Concensus Group, 2009. Consensus statement for diagnosis of obesity, abdominal obesity and the metabolic syndrome for Asian Indians and recommendations for physical activity, medical and surgical management. J. Assoc. Phys. India 57, 163–170.

Ormel, J., VonKorff, M., Ustun, T.B., Pini, S., Korten, A., Oldehinkel, T., 1994. Common mental disorders and disability across cultures. Results from the WHO collaborative study on psychological problems in General Health Care. JAMA 272, 1741–1748.

Patel, V., Kleinman, A., 2003. Poverty and common mental disorders in developing countries. Bull. World Health Organ. 81, 609–615.

Pourhoseingholi, M.A., Vahedi, M., Rahimzadeh, M., 2013. Sample size calculation in medical studies. Gastroenterol. Hepatol. Bed Bench 6, 14–17.

Prabhakaran, D., Jeemon, P., Roy, A., 2016. Cardiovascular diseases in India: current epidemiology and future directions. Circulation 133, 1605–1620.

Pradeepa, R., Anjana, R.M., Joshi, S.R., Bhansali, A., Deepa, M., Joshi, P.P., Dhandania, V.K., Madhu, S.V., Rao, P.V., Geetha, L., Subashini, R., Unnikrishnan, R., Shukla, D.K., Kaur, T., Mohan, V., Das, A.K., ICMR-INDIAB Collaborative Study Group, 2015. Prevalence of generalized & abdominal obesity in urban & rural India–the ICMR-INDIAB Study (Phase-I) [ICMR- NDIAB-3]. Indian J. Med. Res. 142, 139–150.

Rani, M., Bonu, S., Jha, P., Nguyen, S.N., Jamjoum, L., 2003. Tobacco use in India: prevalence and predictors of smoking and chewing in a national cross sectional household survey. Tob. Control 12, e4.

Rathod, S.D., Nadkarni, A., Bhana, A., Shidhaye, R., 2015. Epidemiological features of alcohol use in rural India: a population-based cross-sectional study. BMJ Open 5 e009802.

Riley, L., Guthold, R., Cowan, M., Savin, S., Bhatti, L., Armstrong, T., Bonita, R., 2016. The world health organization STEPwise approach to noncommunicable disease risk-factor surveillance: methods, challenges, and opportunities. Am. J. Public Health 106, 74–78.

Sagar, R., Pattanayak, R.D., Chandrasekaran, R., Chaudhury, P.K., Deswal, B.S., Lenin Singh, R.K., Malhotra, S., Nizamie, S.H., Panchal, B.N., Sudhakar, T.P., Trivedi, J.K., Varghese, M., Prasad, J., Chatterji, S., 2017. Twelve-month prevalence and treatment gap for common mental disorders: findings from a large-scale epidemiological survey in India. Indian J. Psychiatry 59, 46–55.

Sharma, K., 2013. Human development and south east asian countries: special emphasis on India. J. Educ. Health Promot. 2, 45.

Steel, Z., Marnane, C., Iranpour, C., Chey, T., Jackson, J.W., Patel, V., Silove, D., 2014. The global prevalence of common mental disorders: a systematic review and meta-analysis 1980-2013. Int. J. Epidemiol. 43, 476–493.

Tripathy, J.P., Thakur, J.S., Jeet, G., Chawla, S., Jain, S., 2017. Alarmingly high prevalence of hypertension and pre-hypertension in North India-results from a large cross-sectional STEPS survey. PLoS One 12 e0188619.

WHO, 2019. Risk Factors. [WWW Document], n.d.. WHO. URL http://www.who.int/topics/risk_factors/en/ (Accessed 11.15.18).

Wittchen, H.-U., Mühlig, S., Beesdo, K., 2003. Mental disorders in primary care. Dialogues Clin. Neurosci. 5, 115–128.