

Neuroepidemiology of Common Neurological Disorders in Kashmir

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Abstract

Background: Neurological disorders, constituting major health hazards, are growing cause of morbidity with huge magnitude and burden. The burden in general is more in populations with limited resources affecting access to treatment. Reliable data on prevalence on neurological disorders is scanty in Kashmir where people have been experiencing continuous stress because of militancy related disturbance. A prospective population based study was undertaken in Hazratbal block of Srinagar district to determine the prevalence of neurological disorders to facilitate planning and prioritizing neurology care.

Method. The study, a cross sectional survey using cluster sampling was undertaken using a culturally adapted version of structured and pretested questionnaire translated into local language. In the first phase households were screened to identify persons with a possible disorder of interest. Individuals with neurological disorders were examined by a senior neurologist for diagnosis. The data was subjected to statistical analysis to work out Odds Ratio and prevalence rate.

Results: The crude prevalence rate of major neurological disorders was 5186.78 per 100,000 of population. Among the diseases, headache was found to be the predominant disorder with a crude prevalence rate of 3433.91 followed by stroke (898.97) and seizure (387.93). Other neurological disorders observed in descending order of frequency included peripheral nerve disorders (172.41), dementia (100.57, cerebral palsy (71.84), spinal cord disorders (57.47), Parkinson's disease (57.47), tremors (28.74), mental retardation (28.74) and motor neuron disease (28.74). While a significant high prevalence rate of headache was observed in females, other diseases were comparatively high in males. Stroke was significantly higher in males. The prevalence rate in unskilled work force was 3362.05 per 100,000 population compared to 143 for professionals.

Conclusion: The high prevalence rate of neurological disorders in Kashmir is probably associated with the stress the community has been subjected to since 1990. These results carry a very important public health message. This population based survey provides basic information that will be crucial for developing, not only hospital based but also community based neurological services in Kashmir. This also highlights the importance of redefining the medical care system in the state to provide relief to the people especially in rural and remote areas.

Key words: Neurological disorders, Prevalence, Kashmir, Headache, Seizures, Cerebrovascular disorder

I. Introduction

Neurological disorders constitute major health hazards in developing as well as developed countries causing a substantial social and financial loss to the society [1]. WHO data suggests that neurological disorders are growing cause of morbidity, affecting more than 450 million people globally [2]. Most of the information on epidemiological disorders stems from developed countries and burden of these diseases in developing countries remains largely less recognized [3]. Moreover the burden imposed by such chronic neurological conditions in general can be devastating in the poor populations with limited resources. Primary manifestation of the impact on the poor may be loss of gainful employment with attendant loss of family income. In addition to health cost, those suffering from these conditions are also victims of human rights violations, stigmatization and discrimination which further limit patient's access to treatment.

The socio-demographic and epidemiological transition in developing countries has changed the morbidity and mortality pattern among communities. This has brought non-communicable diseases to the forefront of the health care delivery system. Within this group neurological disorders constitute a significant proportion affecting morbidity, mortality, disability and quality of life [4]. Elderly people are at a high risk for disease and disability. The most remarkable effects of population aging are expected in the most developing regions such as China, India and Latin America [5]. By the year 2020 70 % of world population aged above 60 years will be in developing countries with 14.2 % in India [6]. In India recently a change is observed in demographic profile towards a growing aging population [7].

Kashmir valley situated in North Western Himalayan region of India has been experiencing large scale political turbulence continuously since 1990, thus exposing people to tremendous stress. This has given rise to numerous neurological problems in the community causing various degrees of disability and loss of productive life besides negatively influencing the socioeconomic conditions of the people. There have not been many organized studies on neurological disorders in Kashmir despite high rate of morbidity due to these disorders. Earlier studies undertaken in Kashmir were based on specific and smaller populations, geographic isolates and hospital populations [8, 9, 10, and 11]. The information available relate to a highly selected, non representative and small proportion of the general population. Therefore, it may not reflect the true dimensions of the disorders prevalent in a community. While accurate and quantifiable data on health problems prevalent in a community are imperative for formulating objective and credible health policies, reliable data on prevalence and pattern of many diseases especially neurological disorders is scanty. In this scenario it is crucial to determine, through neuro-epidemiological approach, the magnitude and pattern of neurological disorders to facilitate planning and prioritizing health needs of healthcare delivery system. The aim of the present study was, therefore, to determine the prevalence of neurological disorders in general population of Kashmir to identify gaps in our present knowledge to facilitate planning and prioritizing neurology care.

II. Materials And Methods

2.1 Study Area

Strategically located Kashmir valley, constituting the northern most extremity of India with distinct temperate climate, is located between 20 and 36 degree N latitude with elevation ranging from 300 to 8400 m above sea level [12]. The population of the state is 10.25 million out of which 23.83 % has been recorded as urban against the national average of 25.72% (13). Hazratbal Community Block of District Srinagar with a population of about 0.15 million [13], distributed in nine zones, was taken up for study. The area has a distinction of having both urban and rural population of varied socioeconomic conditions. The total area of the block is 105 square kilometers. The study, a cross sectional survey, using cluster sampling, was undertaken in both urban and rural areas of the survey area which was representative of the population of Kashmir of all age groups.

A team of trained surveyors selected households through cluster sampling followed by simple random sampling. All members of selected households were listed and one adult participant was identified within each household family as key informant. Sampling was facilitated by the Economic Survey of Jammu and Kashmir [13] providing all socioeconomic and other relevant information. A household is defined as a group of persons generally relatives by blood, marriage and adoption who live in the same dwelling (housing unit) and share their incomes. Verbal informed consent was obtained from the key informants before asking survey questions. A total of 7648 population was selected by random sampling. After excluding children less than 7 years of age, the net study population came down to 6960. Institutional households like paying guest accommodation, hostels, houseboats and hotels used for tourists were excluded. Security forces and those not conversant with local language were also kept out of the survey.

2.2 Screening Instrument

The screening instrument for the survey was a culturally adapted version of the structured questionnaire developed for these surveys on the basis of International Headache Society and WHO protocol criteria to seek medical and demographic information for the diagnosis of headache disorders [14]. The manual for descriptive studies for epidemiological studies in the developing countries was the key resource document [15]. The questionnaire was translated in local vernacular and then administered to local respondents. The sensitivity and specificity of the questionnaire was found to be 98 percent and 98 percent respectively.

2.3. General Study Design

The study was conducted under two phases. In the first phase sample of households was screened to identify the persons who possibly had a disorder of interest using pre tested' questionnaire. For this phase, population surveyed was put in eight sub groups in terms of age with a span of ten years. Individuals with neurological disorders were then examined by a senior neurologist in the second phase. The study population in the second phase was categorized in terms of age as, child/adolescent (7-18 years), young adults (19-45 years), middle age adults (46-65 years), and elderly senior citizens (> 65 years). Socioeconomic data of the study population in the second phase was also enumerated providing information about occupation and gender. The data collected was statistically analyzed using relevant software to work out Odds ratio. Prevalence rate and p values were' ascertained using -Chi Square test.

III. Results

3.1 Population Characteristics

Out of the total population of 7648 sampled net population of 6960 were studied. Six hundred and eighty eight children below 7 years of age which contribute about 9% of the population were excluded in the study in accordance with the WHO protocol (14).

Table 1: Response of study population to the questionnaire

Study Population		Total Number	Percentage	
Sample taken		7,648	6.80	
Excluded (children < 7 years of age)		688	9.0	
Net study population		6,960	91	
Screened population	Phase – 1	381	5.47	
	Phase - 2	Non responders	15	3.94
		Negative response	5	1.31
		Net positive	361	94.75

The studied sample of 6960 comprised of 3602 (51.75%) males and 3358 (48.25%) females. Maximum number of subjects 1806 (25.95%) belonged to 10-19 years age group followed by 20-29 years age group which included 1498 (21.52%) subjects. The next major age group was 20-29 years. However gender proportion in all the age groups was almost same, bearing no significant difference ($p > 0.05$). This predicts that the cohort was age and sex matched (Table -2)

Table 2: Age & sex distribution of study population

Age (Years)	Male (%)	Female (%)	Total (%)
< 9	190 (5.27)	162 (4.83)	352 (5.06)
10 – 19	953 (26.46)	853 (25.45)	1806 (25.95)
20 – 29	791 (21.96)	707 (21.09)	1498 (21.52)
30 – 39	582 (16.16)	635 (18.94)	1217 (17.49)
40 – 49	460 (12.77)	425 (12.68)	885 (12.72)
50 – 59	292 (8.11)	269 (8.03)	561 (8.06)
60 – 69	198 (5.50)	182 (5.43)	380 (5.46)
> 70	136 (3.78)	125 (3.73)	261 (3.75)
Total	3602 (51.75)	3358 (48.25)	6960 (100)

Chi square = 9.705, $p = 0.206$ (Non-Significant)

3.2 Age and Sex Distribution

The age and sex distribution of studied positive cases is shown in table -3. The observations show 361 positive cases of neurological disorders among the cohort wherein 169 (46.8%) were males and 192 (53.2%) were females. This gave a prevalence of 5186.78 per 1, 00,000 for neurological disorders. It has been observed that children (< 9 years) constituted 3.00 per cent and elderly adults (> 70 years) 5.5 per cent of the total positive cases. Population in the age group of 30-39 years were found to have high incidence of 24.9 per cent which constituted 1293.10 per 100,000 of the population followed by the age group of 50-59 and 20-29 years which constituted 16.6 and 15.8 percent respectively

Table 3: Age and sex distribution of the studied positive cases of our study

Age (Years)	Male (%)	Female (%)	Total (%)	Prevalence rate per lac
< 9	8 (4.7)	3 (1.6)	11 (3.0)	158.05
10 – 19	10 (5.9)	30 (15.6)	40 (11.1)	574.71
20 – 29	21 (12.4)	36 (18.8)	57 (15.8)	818.97
30 – 39	41 (24.3)	49 (25.5)	90 (24.9)	1293.10
40 – 49	25 (14.8)	21 (10.9)	46 (12.7)	660.92
50 – 59	28 (16.6)	32 (16.7)	60 (16.6)	862.07
60 – 69	24 (14.2)	13 (6.8)	37 (10.2)	531.61
≥ 70	12 (7.1)	8 (4.2)	20 (5.5)	287.36
Total	169 (46.8)	192 (53.2)	361 (100)	5187.78

Chi square = 20.233; $p = 0.005$ (Significant)

3.3 Demographic Profile of Positive Subjects

The minimum and maximum age in males was 7 and 88 years respectively with an average age of 41.95 ± 17.95 . Similarly the minimum and maximum age of female subjects was 7 and 80 years respectively with an average age of 36.70 ± 17.03 . The difference in age as per gender did not show any significant difference ($p > 0.05$). Hence it is concluded that the studied subjects in our study were age and sex matched (Table 4)

Table 4: Demographic profile of positive subjects with neurological disorder

	Male	Female	Total
Frequency	169	192	361
Prevalence Rate / Lac	2428.16	2758.62	5186.78
Mean \pm SD (Range)	41.95 \pm 17.95 (7 – 88)	36.70 \pm 17.03 (7 – 80)	39.16 \pm 17.64 (7 – 88)
Median	40.00	35.00	37.00
p = 0.005 (Significant)			

3.4 Occupation and gender distribution

Among the positive cases studied, prevalence rate of neurological disorders was significantly high in unskilled population. The majority of the cases i.e. 64.8% or 234 subjects were un-skilled workers which also included students and unemployed people. The prevalence rate of neurological disorders was 3362.07 per 1, 00,000 of population. The difference in prevalence rate as per occupation showed a significant difference ($p < 0.05$) (Table 5).

Table 5: Occupation and gender of the studied positive cases

Occupation	Male (%)	Female (%)	Total (%)	Prevalence rate / lac
Un-skilled	77 (45.6)	157 (81.8)	234 (64.8)	3362.07
Semi-skilled	51 (30.2)	13 (6.8)	64 (17.7)	919.54
Skilled	34 (20.1)	19 (9.9)	53 (14.7)	761.49
Professional	7 (4.1)	3 (1.6)	10 (2.8)	143.68
Total	169 (100)	192 (100)	361 (100)	5186.78
Chi Square = 54.514; $p < 0.05$ (Significant)				

3.5 Prevalence of Neurological Disorders

Among the various neurological disorders headache, cerebrovascular disorders, seizures were three major and most frequent disorders with an overall prevalent rate of 3433.91, 818.97 and 387.93 per 100, 00 people respectively. Population found affected by other neurological disorders included peripheral nerve disorders (172.41), dementia (100.57), cerebral palsy (71.84), spinal cord disorders (57.47), Parkinson’s disease (57.47), tremors (28.74), mental retardation (28.74) and motor neuron disease (28.74). While a significant high prevalence rate of headache was observed in females, other diseases were comparatively high in males. Stroke was significantly higher in males. Overall difference in neurological disorders among male and female was significant ($p < 0.05$) (Table 6).

Table 6: Prevalence of common neurological disorders in the studied subjects as per gender

Neurological Disorder	Male (%)	Female (%)	Total (%)	OR*	Rate / Lac	Result
Headache	92 (54.4)	147*(76.6)	239 (66.2)	2.73	3433.91	$p < 0.05$ (Sig.)
Seizure	15*(8.9)	12(6.3)	27 (7.5)	1.46	387.93	$p > 0.05$ (NS)
Cerebrovascular disorders	37*(21.9)	20 (10.4)	57 (15.8)	2.41	818.97	$p < 0.05$ (Sig.)
Peripheral Nerve disorders	7*(4.1)	5 (2.6)	12 (3.3)	1.62	172.41	$p > 0.05$ (NS)
Dementia	5*(3.0)	2(1.0)	7(1.9)	2.90	100.57	$p > 0.05$ (NS)
Spinal Cord disorder	3*(1.8)	1 (0.5)	4 (1.1)	3.45	57.47	$p > 0.05$ (NS)
Parkinson’s disease	3*(1.8)	1(0.5)	4(1.1)	3.45	57.47	$p > 0.05$ (NS)
Tremor	1*(0.6)	1(0.5)	2(0.6)	1.14	28.74	$p > 0.05$ (NS)
Mental Retardation	1*(0.6)	1(0.5)	2(0.6)	1.14	28.74	$p > 0.05$ (NS)
Cerebral Palsy	3*(1.8)	2(1.0)	5(1.4)	1.72	71.84	$p > 0.05$ (NS)
Motor Neuron disease	2*(1.2)	0 (0.0)	2 (0.6)	4.60	28.74	$p > 0.05$ (NS)
Total	169(100)	192(100)	361(100)			
Chi-square = 22.505; $p = 0.013$ (Significant)						

NS = Non-significant; Sig. = Significant; OR = Odds ratio* = Odd’s ratio calculated on that value

The age specific rates of neurological disorders are shown in table 7. The results show that significantly highest rates ($p < 0.05$) occur among individuals falling in the age group of 19-45 years with prevalence rate of 2715 per 100000 people. Prevalence rate of 1451 was observed in the population of 46-65 age groups. While headache was more common in young adults (19-45 years) and middle age adults (46-65), Cerebrovascular disorder was more prevalent in population in the age group of 46-65 years. Seizers were more prevalent in adolescent /child and young adult stage and negligible in middle age adults.

Other neurological disorders observed in descending order of frequency included peripheral nerve disorders (172.41), dementia (100.57, cerebral palsy (71.84), spinal cord disorders (57.47), Parkinson’s disease (57.47), tremors (28.74), mental retardation (28.74) and motor neuron disease (28.74). While a significant high

prevalence rate of headache was observed in females, other diseases were comparatively high in males. Stroke was significantly higher in males.

Table 7 Neurological disorders as per age and sex in the studied subjects

Age (yrs)	Gender	Neurological Disorders											P value	
		Head ache (%)	Seizure disorder %	Cerebrovascular disorder %	Peri pheral nerve disorder %	Dim entia (%)	Spinal cord disorder (%)	Parkinson disease (%)	Tremor (%)	Mental retardation (%)	Cerebral palsy (%)	Motor neuron disease (%)		Total (%)
7-18 child/ adolescent	Male	7 (41.2)	79 (41.2)	-	-	-	-	-	-	1	2 (11.8)	-	17 (100)	>0.05
	Female	24 (72.7)	5 (15.2)	-	1 (3)	-	-	-	-	1	2 (6.1)	-	33 (100)	(NS)
	Total	31 (62.0)	12 (24.0)	-	1 (2)	-	-	-	-	2	4 (8.0)	-	50 (100)	
19-45 Young adult	Male	61 (70.9)	8 (9.3)	9 (10.5)	4 (4.7)	-	292.3)	-	-	-	1 (1.2)	1 (1.2)	86 (100)	<0.05 (Sig)
	Female	90 (87.4)	5 (4.9)	1 (1.0)	4 (3.9)	-	1(1.0)	1 (1.0)	1 (1.0)	-	-	-	103 (100)	
	Total	151 (79.9)	13 (6.9)	10 (5.3)	8 (4.2)	-	391.6)	1 (0.5)	1 (0.5)	-	1 (0.5)	1 (0.5)	189 (100)	
46-65 Middle age adult	Male	24 (45.3)	-	19 (35.8)	3 (5.7)	1 (1.9)	1(1.9)	3 (5.7)	1 (1.9)	-	-	1 (1.9)	53 (100)	>0.05 (NS)
	Female	29 (60.4)	2 (4.2)	15 (31.3)	-	2 (4.2)	-	-	-	-	-	-	48 (100)	
	Total	53 (52.5)	2 (2.0)	34 (33.7)	3 (3.0)	3 (3.0)	1(1.0)	3 (3.0)	1 (1.0)	-	-	1 (1.0)	101 (100)	
>65 Elderly	Male	-	-	9 (69.2)	-	4 (30.8)	-	-	-	-	-	-	13 (100)	<0.05 (Sig)
	Female	4 (50.0)	-	4 (50.0)	-	-	-	-	-	-	-	-	8 (100)	
	Total	4 (19.0)	-	13 (61.9)	-	4 (19.0)	-	-	-	-	-	-	21 (100)	

NS= Non Significant; Sig= Significant

IV. Discussion

Enumeration and screening is a crucial component of epidemiological studies which require specialist manpower and trained health workers. Studies of this nature are challenging in disturbed zones like Kashmir India with insufficiencies in healthcare infrastructure and personnel coupled with uneasy environment. Despite these resource constraints, technological and other limitations, studies on the prevalence of neurological disorders were undertaken to determine the status of this disorder and to demonstrate the urgency for effective public health interventions. Earlier few studies have been undertaken in Kashmir which apart from epidemiological study [8, 9], all have been clinic based.

The successful completion of the main study in Hazratbal Community Block District Srinagar suggests that a community survey of such nature is feasible even in situations of scarce resources and uneasy environment. The sensitivity and specificity achieved by the study questionnaire are comparable to those from other studies that have used a similar protocol [7, 16, and 17]. It demonstrated that the strategy of evaluating subjects with abnormal responses usually in their homes improved community compliance and minimized loss of work days for follow up.

The sex distribution of the subjects screened is similar to the general pattern observed in Kashmir. The population census from this study showed that the community is predominantly young with only 9% of population over the age of 60 years. The relatively young population in this community, as in other parts of Kashmir, is similar to the general pattern in developing countries but contrasts with the population structure in industrialized countries where about 15% of population is above 60 years [4, 7, and 13]. The socio demographic characteristics have revealed that people are predominantly involved with unskilled occupational categories

(65.6%). The low literacy rates and high levels of unemployment may be responsible for this disparity. Based on this population based neuro epidemiological survey it can be summarized that 5 percent of the population in Kashmir are suffering from neurological disorders against nearly 3 percent reported for India [4]. In our study 361 out of 6960 screened subjects were positive for various neurological disorders with overall crude prevalence rate of 5187 per 1,00,000. This figure is high compared to other studies [4, 18]. The overall prevalence rate of neurological disorders in the community in earlier studies has varied from 984 to 4070 per 100,000 populations [4, 8, 18, 19, 20, 21, and 22]. In an earlier study in South Kashmir prevalence rate of neurological disorders was as low as 967 [8]. High incidence of neurological disorders in the present studies is primarily because of the continuous turmoil, the population in Kashmir has been subjected to, since 1990. In 1984 the environment in the state was peaceful which explains the low prevalence rate at that time [8].

In our studies overall prevalence among the positive cases was 53.18 percent in females and 46.81 percent in males which is consistent with the studies undertaken in other parts of country [4, 7, and 23]. Headache disorders were most predominant disorder affecting 66.20 percent population with female preponderance which peaked in the fourth decade of life for both men and women. Prevalence declined after the age of 45 years in both genders. Similar trend was observed in Bangalore [24]. Globally prevalence of 47 percent headache was recorded [25]. The gender differentiation in headache prevalence in our studies may be explained by biological and socio cultural influences. The preponderance of females is reported universally [9, 26, and 27]. However, in the present studies men were predominant sufferers in cerebrovascular and seizures compared to women which is in consonance with the observations reported from Kashmir [8, 11]. The studies from Bengal on sex specific prevalence of cerebrovascular disorder showed prevalence rate of 510.39 among men as against 460.59 among women [23].

Our observations also indicate that the prevalence rate of neurological disorders was highest (3362.07 per 100,000 of population) in unskilled workers. Unskilled worker class is generally either illiterate or less educated with limited resources. This class of the society was hard hit during the period of turmoil which might have contributed to high prevalence of neurological disorder. Low literacy rate, unemployment, low socioeconomic status, and lack of access to professional healthcare, ineffective treatment and improper referrals have been cited contributing factors for high incidence of neurological disorders for populations with limited resources [24, 27, 28, and 29].

V. Conclusion.

The crude prevalence rate of 5186.78 per 100000 of population in the present studies in Kashmir, a disturbed zone of India, is very high. Headache, cerebrovascular disorder and seizures were more prevalent affecting the population at different stages of life. This carries a very important public health message. The results of our studies have also identified the need for establishing a mechanism in the state of Jammu & Kashmir for generating epidemiological data and conducting further analytical studies with the objective of preventing the occurrence of neurological diseases. This population based survey provides basic information that will be crucial for developing not only hospital base but also community based neurological services in the state.

References

- [1]. BK Mac Donald, OC Cockerell, TWAS Sander and SD Shorvon. The incidence and life time prevalence of neurological disorders in a prospective community based study in the U.K. *Brain*, 2000; 123, (4): 665-676
- [2]. CD Mathers, AD Lopez and CJL Murray. The burden of disease and mortality by conditions: Data, Methods and Results for 2001. In *Global Burden of Disease and Risk factors*. Eds. AD Lopez, CD Mathers, M Ezzat, DT Jamison and CJL Murray. New York: Oxford University Press.
- [3]. LJ Stovner and C Andree .Prevalence of headache in Europe: A review for the Eurolight project. *J. Headache Pain* 2010;11:289-299
- [4]. M Gaurie-Devi, G Gururaj, P Satischandra and DK Subbakrishna . Prevalence of neurological disorders in Bangalore, India. A community based study with a comparison between rural and urban areas. *Neuroepidemiology* 2004; 23: 261-268.
- [5]. TS Sathanarayana Rao and KS Shaji. Demographic aging. Implications for mental health. *Indian J. Psychiatry*. 2007; 49:78-80.
- [6]. World Health Organization WHO. Population aging: A public health challenge. Fact Sheet No.13. Geneva WHO. 1998.
- [7]. SK Das and K Sanyal. Neuroepidemiology of major neurological disorders in rural Bengal. *Neurology India*. 1996; 44: 47-58.
- [8]. S Razdan, RL Koul , A Motta , S Koul and RK Bhatt . Prevalence and pattern of major neurological disorders in rural Kashmir India in 1986. *Neuroepidemiology* 1994; 13(31): 113-9.
- [9]. AH Malik, PA Shah, Y Yawar. Prevalence of primary headache disorders in school going children in Kashmir valley (North West India). *Ann Indian Acad Neurol*.2012; 15(Suppl 1):101-105.
- [10]. AH Malik, PA Shah, Y Yawar. Prevalence of primary headache disorders in school going children in Kashmir valley (North West India). *Ann Indian Acad Neurol*.2012; 15(Suppl 1):101-105.
- [11]. PA Shah and A, Nafee. Clinical profile of headache and cranial neuralgias 1999; *Assoc Physc Ind* 47:1072-75.
- [12]. PA Shah, SF Shapoo, RK Koul and MA Khan .Prevalence of epilepsy in school going children (6-18 years) in Kashmir Valley of North West India. *Journal of the Indian Medical Association* 2009;107(4):216-218
- [13]. MA Masoodi Agriculture in Jammu and Kashmir A Perspective .2003 Mohisarw Book Series Srinagar. Government of Jammu and Kashmir. Economic Survey 2011-12. Government of Jammu and Kashmir. Directorate of Economics and Statistics Jammu and Kashmir Government.

- [14]. World Health Organization. Research protocol for measuring the prevalence of neurological disorders in developing countries .Neuroscience programme Geneva 1981.
- [15]. M Gourie Devi, G Gururaj and P, Satishchandra. A manual for descriptive studies: Neuroepidemiology in developing countries 2nd edn. Prism Bangalore
- [16]. M Munoz F Boutros Toni and PM Preux . Prevalence of neurological disorders in Haute-Vienne Department (Limousin-Region France). *Neuroepidemiology* 1995; 14: 193-198.
- [17]. G Padilla Ardilla, BE Vesga Angartica and FE Leon Sarmiento, Study of neurological diseases prevalence in Aratocha, a rural area of eastern Columbia. *Rev. Med. Chil. Jul. 2002; 130 (7): 829.*
- [18]. SK Kapoor, V Chandra, AK Banerjee and LM Nath, Schoenberg BS. Pilot study of the prevalence of major neurological disorders in a rural population in India. *Neuroepidemiology* 1990; 9:287-295.
- [19]. M Gourie Devi, G Gururaj and P Satishchandra. Neuroepidemiology in India. A Perspective. In; Clifford RF editor.Recent Advances in Tropical Neurology. Amsterdam. Elsevier Science Publishers BV; 1995.p 17-30
- [20]. M Gourie Devi, G Gururaj, P Satishchandra, DK Subbakrishna. Neuroepidemiological pilot survey of an urban population in a developing country. A study in Bangalore South India 1996 ;15:313-320
- [21]. SP Saha, S Bhattacharya, SK Das, B, Maity, T Roy and DK Raut. Epidemiological study of neurological disorders in a rural population of Eastern India. *J Indian Med Assoc* 2003; 101:299-300.
- [22]. BO Osuntokum, AOG Adeuja and BS Schoenberg, et al .Neurological disorders in Nigerian Africans. A community based study. *Acta Neurol Scand* 1987; 75:13-21.
- [23]. SK Das, A Biswas, T Roy, TK Banerjee , CS,Mukherjee and DK Raut et al. A random sample survey of major neurological disorders in Kolkata. *Indian J. Med Res* 2006; 124:163-72.
- [24]. G Gururaj, GB,Kulkarni, GN Rao, DK,Subbakrishna, LJ Stovner and TJ Steiner. Prevalence and Sociodemographic correlates of Primary headache disorders: Results of a Population-based Survey from Bangalore India. *Indian Journal of Public Health* 2014; 58(4):241-48.
- [25]. LJ Stovner, K, Hagen, R Jensen, Z Katarawa, R Lipton A, Scher et al. A global burden of headache: A documentation of headache prevalence and disability worldwide. *Cephalalgia* 2007; 27:193-210.
- [26]. KZ Hagen, JA Zwart, L Vatten, L Stovner and G Bovim . Prevalence of migraine and Non migraine headache –head- HUNT, a large population based study. *Cephalalgia* 2000;20:900-906
- [27]. GB Kulkarni, GN Rao, G, Gururaj, LJ Stovner and TJ Steiner. Headache disorders and public ill health in India: prevalence estimates in Karnataka state. *J. Headache Pain* 2015 (16): 76etal 2015
- [28]. World Health Organization and Lifting the Burden. ATLAS of Headache Disorders and resources in the world 2011 Geneva: World Health Organization 2011.
- [29]. K Hagen, L Latten, LJ Stovner, JA Zwart, S Krokstad and G Bowim . Low socioeconomic status is associated with increased risk of frequent headache. A prospective study of 22718 adults in Norway. *Cephalalgia* 2002; 22:672-9.