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Why Indian Journal of Preventive Medicine?

Welcome to the birth of the Indian Journal of Preventive Medicine. The changes are occurring in health status of Indian population. The incidence of some communicable diseases like Cholera, Malaria, Leprosy, Diphtheria, Tetanus, Pertussis etc. is slowly coming down and there are hopes that India will be free from Poliomyelitis in near future because of better immunization coverage & better health care services. At the same time, there is no change in the pattern of Tuberculosis, Filariasis, Viral hepatitis, Malnutrition related disorders. The emerging and re-emerging diseases, HIV & TB co-infection, increasing, drug resistance in certain diseases are posing a great threat to the community. Because of change in the lifestyle, increasing urbanization, industrialization, airpollution, drug abuse etc., the prevalence of non-communicable diseases like hypertension, coronary heart diseases, diabetes mellitus, cancers, mental disorders is gradually increasing. On the other hand, improved medical technology and timely interventions are prolonging the life expectancy of the human beings. Still, we have to make more efforts for the prevention of both communicable & non-communicable diseases in the entire world, particularly in the developing countries like India. For this purpose, the Indian Journal of Preventive Medicine will show a ray of hope to the medical fraternity by publishing the scientific articles so that ultimately the general population will enjoy a good healthy life. Let, all of us welcome the birth of Indian Journal of Preventive Medicine.

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Primary and Secondary Prevention of Diabetic Peripheral Neuropathy: An Update

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Abstract

Diabetic neuropathy (DN) is a debilitating disorder that occurs in nearly 50 percent of patients with diabetes, causing motor deficits, silent cardiac ischemia, orthostatic hypotension, vasomotor instability, hyperhidrosis, gastroparesis, bladder dysfunction, and sexual dysfunction. The objective of his short communication was to provide an insightful overview of prevention of diabetic peripheral neuropathy (DPN), a common disabling microvascular complication of diabetes and its associated foot complications. Glycemic control is an essential intervention shown to be beneficial in both type-1 and type-2 diabetes patients in preventing microvascular and neuropathic foot complications. Medical management comprising of acetyl-L-carnitine, Aldose reductase inhibitors, antioxidants, essential fatty acids, chromium, ginkgolides, and pentoxifylline, Ciliary neurotrophic factor, coenzyme Q10, edaravone, Erythropoietin and its carbamylated derivative, gamma linolenic acid, gangliosides, GCPII (NAALADase) inhibitor, glutathione, IGF1, methylcobalamin, Olive (Oleaeuropaea L.) leaf extract, oxygen supplementation and Tolrestat (Giugliano et al, 1995) were reported for preventing DPN. Flexor tenotomy, insoles, Podikon digital silicone padding, tibial neurolysis, surgical decompression of lower extremity peripheral nerves were reported for their efficacy to prevent diabetes-related neuropathic foot complications.

Keywords: Preventive medicine; Preventive endocrinology; Preventive neurology; Diabetic neuropathy; Primary and secondary prevention.

Diabetic neuropathy (DN) is a debilitating disorder that occurs in nearly 50 percent of patients with diabetes, causing motor deficits, silent cardiac ischemia, orthostatic hypotension, vasomotor instability, hyperhidrosis, gastroparesis, bladder dysfunction, and sexual dysfunction.[1] The objective of his short communication was to provide an insightful overview of prevention of diabetic peripheral neuropathy (DPN), a common disabling microvascular complication of diabetes.

Pathogenetic biochemical mechanisms of DN involved sorbitol andmyo-inositol (MI) metabolism, phosphoinositides, protein kinase C, and the (Na,K)-ATPase,[2] and among these, "a rise in tissue sorbitol secondary to concentration-dependent activation of polyol pathway activity by glucose, and an accompanying fall in tissue myo-inositol and Na-K-ATPase activity have recently been linked to a self-reinforcing cyclic metabolic defect that accounts for rapidly reversible slowing of conduction in peripheral nerve in diabetes.

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Impaired Na-K-ATPase activity also appears to be responsible for intracellular Na+ accumulation and resultant localized axonal paranodal swelling that characterizes diabetic neuropathy in both humans and laboratory animals."[3]

Glycemic control is an essential intervention shown to be beneficial in both type-1 and type-2 diabetes patients in preventing microvascular and neuropathic complications.[4] Animal models had shown alpha 1-adrenoreceptor antagonists, calcium channel blockers, agents that inhibit the renin-angiotensin system, and vasomodulatorprostanoids, omega-6 essential fatty acids, aldose reductase inhibitors, aminoguanidine prevented the formation of advanced glycation end-products.[5]

Current recommendations include optimisation of glycaemic and HbA1c values and correct use of tricyclic antidepressants, none of the other substances tested has proven to be efficacious for PDN. Gangliosides, aldose-reductase inhibitors, including tolrestat, gamma-linolenic acid, levacecarnine (acetyl-L-carnitine) and antioxidants, were all shown to be of poor efficacy and often with significant adverse effects.[6]

Medical management comprising of acetyl-L-carnitine,[7] Aldose reductase inhibitors,[8,9,10] antioxidants, essential fatty acids, chromium, ginkgolides, and pentoxifylline,[11] Ciliary neurotrophic factor,[12] coenzyme Q10,[13] edaravone,[14] Erythropoietin[15] and its carbamylated derivative,[16] gamma linolenic acid,[17] gangliosides,[18] GCPII (NAALADase) inhibitor,[19] glutathione,[20] IGF1,[21] methylcobalamin,[22] Olive (Oleaeuropaea L.) leaf extract,[23] oxygen supplementation,[24] and Tolrestat[25] were reported for preventing DPN.

Futuristic emphasis on a novel conjugate of gamma-linolenic acid and alpha-lipoic acid[26] is essential for preventive practice and Dyckand O'Brien[27] suggested that in controlled clinical trials, a mean change of 2 points on the neurologic disability score, corresponding to a change of motor nerve conduction velocity of the average ulnar median and peroneal nerves of 2.9 m/s and peroneal nerve of 2.2 m/s and corresponding changes of amplitude of 1.2 and 0.7 mV, respectively were to be considered clinically detectable and meaningful.

Ongoing patient and family education can emphasize the importance of preventive self-care measures, with referrals for specialist care and therapeutic footwear if begun early, can prevent foot ulcers from diabetic neuropathy, thereby improving the quality of life and reducing healthcare costs for this chronic disease.[28] Flexor tenotomy,[29] insoles[30] Podikon digital silicone padding,[31] tibial neurolysis,[32] surgical decompression of lower extremity peripheral nerves[33,34] were reported for their efficacy to prevent diabetes-related neuropathic foot complications.

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References

1. Aring AM, Jones DE, Falko JM. Evaluation and prevention of diabetic neuropathy. *Am Fam Physician*. 2005; 71(11): 2123-8.
2. Greene DA, Lattimer SA, Sima AA. Pathogenesis and prevention of diabetic neuropathy. *Diabetes Metab Rev*. 1988; 4(3): 201-21.
3. Greene D.The pathogenesis and prevention of diabetic neuropathy and nephropathy. *Metabolism*. 1988; 37(2 Suppl 1): 25-9.
4. Eastman RC, Garfield SA. Prevention and treatment of microvascular and neuropathic complications of diabetes. *Prim Care*. 1999; 26(4): 791-807.
5. Cameron NE, Cotter MA. Potential therapeutic approaches to the treatment or prevention of diabetic neuropathy: evidence from

experimental studies. *Diabet Med*. 1993; 10(7): 593-605.

6. Fedele D, Giugliano D. Peripheral diabetic neuropathy. Current recommendations and future prospects for its prevention and management. *Drugs*. 1997; 54(3): 414-421.
7. Sima AA, Ristic H, Merry A, Kamijo M, Lattimer SA, Stevens MJ, et al. Primary preventive and secondary interventionary effects of acetyl-L-carnitine on diabetic neuropathy in the bio-breeding Worcester rat. *J Clin Invest*. 1996; 97(8): 1900-7.
8. Airey M, Bennett C, Nicolucci A, Williams R. Aldose reductase inhibitors for the prevention and treatment of diabetic peripheral neuropathy. *Cochrane Database Syst Rev*. 2000; 2: CD002182.
9. Kamijo M, Cherian PV, Sima AA. The preventive effect of aldose reductase inhibition on diabetic optic neuropathy in the BB/W-rat. *Diabetologia*. 1993; 36(10): 893-8.
10. Middlemas AB, Agthong S, Tomlinson DR. Phosphorylation of c-Jun N-terminal kinase (JNK) in sensory neurones of diabetic rats, with possible effects on nerve conduction and neuropathic pain: prevention with an aldose reductase inhibitor. *Diabetologia*. 2006; 49(3): 580-7.
11. McCarty MF. Nitric oxide deficiency, leukocyte activation, and resultant ischemia are crucial to the pathogenesis of diabetic retinopathy/ neuropathy—preventive potential of antioxidants, essential fatty acids, chromium, ginkgolides, and pentoxifylline. *Med Hypotheses*. 1998; 50(5): 435-49.
12. Saleh A, Roy Chowdhury SK, Smith DR, Balakrishnan S, Tessler L, Martens C, et al. Ciliary neurotrophic factor activates NF-êB to enhance mitochondrial bioenergetics and prevent neuropathy in sensory neurons of streptozotocin-induced diabetic rodents. *Neuropharmacology*. 2013; 65: 65-73.
13. Zhang YP, Eber A, Yuan Y, Yang Z, Rodriguez Y, Levitt RC, et al. Prophylactic and antinociceptive effects of coenzyme Q10 on diabetic neuropathic pain in a mouse model of type 1 diabetes. *Anesthesiology*. 2013; 118(4): 945-54.
14. Saini AK, Kumar HSA, Sharma SS. Preventive and curative effect of edaravone on nerve functions and oxidative stress in experimental diabetic neuropathy. *Eur J Pharmacol*. 2007; 568(1-3): 164-72.
15. Wu Z, Mata M, Fink DJ. Prevention of diabetic neuropathy by regulatable expression of HSV-mediated erythropoietin. *MolTher*. 2011; 19(2): 310-7.
16. Schmidt RE, Green KG, Feng D, Dorsey DA, Parvin CA, Lee JM, Xiao Q, Brines M. Erythropoietin and its carbamylated derivative prevent the development of experimental diabetic autonomic neuropathy in STZ-induced diabetic NOD-SCID mice. *Exp Neurol*. 2008; 209(1): 161-70.
17. Jamal GA. The use of gamma linolenic acid in the prevention and treatment of diabetic neuropathy. *Diabet Med*. 1994; 11(2): 145-9.
18. Soediono P, Belai A, Burnstock G. Prevention of neuropathy in the pyloric sphincter of streptozotocin-diabetic rats by gangliosides. *Gastroenterology*. 1993; 104(4): 1072-82.
19. Zhang W, Murakawa Y, Wozniak KM, Slusher B, Sima AA. The preventive and therapeutic effects of GCPII (NAALADase) inhibition on painful and sensory diabetic neuropathy. *J Neurol Sci*. 2006; 247(2): 217-23.
20. Bravenboer B, Kappelle AC, Hamers FP, van Buren T, Erkelens DW, Gispen WH. Potential use of glutathione for the prevention and treatment of diabetic neuropathy in the streptozotocin-induced diabetic rat. *Diabetologia*. 1992; 35(9): 813-7.
21. Morgado C, Silva L, Pereira-Terra P, Tavares I. Changes in serotoninergic and noradrenergic descending pain pathways during painful diabetic neuropathy: the preventive action of IGF1. *Neurobiol Dis*. 2011; 43(1): 275-84.
22. Jian-bo L, Cheng-ya W, Jia-wei C, Xiao-lu L, Zhen-qing F, Hong-tai M. The preventive efficacy of methylcobalamin on rat peripheral neuropathy influenced by diabetes via neural IGF-1 levels. *NutrNeurosci*. 2010; 13(2): 79-86.
23. Kaeidi A, Esmaeili-Mahani S, Sheibani V, Abbasnejad M, Rasoulian B, Hajializadeh Z, et al. Olive (Oleaeuropaea L.) leaf extract attenuates early diabetic neuropathic pain through prevention of high glucose-induced apoptosis: in vitro and in vivo studies. *J Ethnopharmacol*. 2011; 136(1): 188-96.
24. Low PA, Tuck RR, Dyck PJ, Schmelzer JD, Yao JK. Prevention of some electrophysiologic and biochemical abnormalities with oxygen supplementation in experimental diabetic neuropathy. *ProcNatlAcadSci U S A*. 1984; 81(21): 6894-8.

25. Giugliano D, Acampora R, Marfella R, Di Maro G, De Rosa N, Misso L, Ceriello A, Quatraro A, D'Onofrio F. Tolrestat in the primary prevention of diabetic neuropathy. *Diabetes Care*. 1995; 18(4): 536-41.

26. Tomlinson DR. Future prevention and treatment of diabetic neuropathy. *Diabetes Metab*. 1998; 24(Suppl 3): 79-83.

27. Dyck PJ, O'Brien PC. Meaningful degrees of prevention or improvement of nerve conduction in controlled clinical trials of diabetic neuropathy. *Diabetes Care*. 1989; 12(9): 649-52.

28. Zangaro GA, Hull MM. Diabetic neuropathy: pathophysiology and prevention of foot ulcers. *Clin Nurse Spec*. 1999; 13(2): 57-65.

29. van Netten JJ, Bril A, van Baal JG. The effect of flexor tenotomy on healing and prevention of neuropathic diabetic foot ulcers on the distal end of the toe. *J Foot Ankle Res*. 2013; 6(1): 3.

30. Paton J, Bruce G, Jones R, Stenhouse E. Effectiveness of insoles used for the prevention of ulceration in the neuropathic diabetic foot: a systematic review. *J Diabetes Complications*. 2011; 25(1): 52-62.

31. Scirè V, Leporati E, Teobaldi I, Nobili LA, Rizzo L, Piaggesi A. Effectiveness and safety of using Podikon digital silicone padding in the primary prevention of neuropathic lesions in the forefoot of diabetic patients. *J Am Podiatr Med Assoc*. 2009; 99(1): 28-34.

32. Dellon AL, Muse VL, Nickerson DS, Akre T, Anderson SR, Barrett SL, et al. Prevention of ulceration, amputation, and reduction of hospitalization: outcomes of a prospective multicenter trial of tibial neurolysis in patients with diabetic neuropathy. *J ReconstrMicrosurg*. 2012; 28(4): 241-6.

33. Dellon AL. Diabetic neuropathy: review of a surgical approach to restore sensation, relieve pain, and prevent ulceration and amputation. *Foot Ankle Int*. 2004; 25(10): 749-55.

34. Dellon AL. Neurosurgical prevention of ulceration and amputation by decompression of lower extremity peripheral nerves in diabetic neuropathy: update 2006. *Acta Neurochir Suppl*. 2007; 100: 149-51.

Original Article

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Predictors of Overweight and Obesity in Rural Indian Adults: A Multivariate Analysis

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Abstract

Background: Rural areas, around Mysore urban agglomeration are influenced by urbanization and are in a phase of socioeconomic and epidemiological transition. Obesity has been one of the major risk factor for diabetes, hypertension and cardiovascular diseases. It is necessary to conduct epidemiological studies to know the burden and determinants of obesity, which helps in planning and implementation of any interventions and allocation of resources.

Objectives: i) To estimate the prevalence of overweight and obesity among adults in a rural area of Mysore district. ii) To identify the factors associated with overweight and obesity.

Materials and methods: 1423 individuals aged above 18 years were interviewed to collect information about their socio-demographic characteristics, risk profile and measurements of height and weight. Prevalence rate and chi square analysis for each factor was performed. Multiple logistic regression analysis was performed to identify the independent factors associated with overweight and obesity.

Results: The overall prevalence of overweight and obesity was 13.2% (189) and 11.5% (164) respectively. Multivariate logistic regression model showed that 45-54 age group (OR 2.30, 95% CI 1.23-4.30), professional adults (OR 3.12, 95% CI 1.36-7.14), class I socio-economic class (OR 2.30, 95% CI 1.03-5.130), increased oil intake (OR 1.50, 95% CI 1.03-2.17), sedentary physical activity (OR 1.84, 95% CI 1.13) as independent risk factors for overweight and obesity among the rural population of Mysore.

Conclusions: Rural population of Mysore with high socio- economic status have high BMI status similar to their urban counterparts.

Keywords: Obesity; Rural; Prevalence; Multivariate analysis; Mysore.

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Introduction

Throughout most of the human history, weight gain and fat storage have been viewed

as signs of health and prosperity. Today, however as standards of living continue to rise; weight gain and obesity are posing a growing threat to the health of the people in countries all over the world.[1]

Obesity is the most prevalent nutritional disorder in western countries and among the urban population in developing countries. In recent years it has started prevailing even in rural population. This can be attributed to change in life style and physical inactivity. Obesity results from incorrect energy balance leading to an increased storage of energy, mainly as fat. It is now so common within the world's population that it is beginning to replace under-nutrition and infectious diseases as the most significant contributor to ill health. Thus, obesity should not be regarded simply as a cosmetic problem affecting certain individuals, but a serious ailment that threatens global well being.[1]

India is passing through a transitional phase of socio-economic development which has the potential of altering the nutritional status of her population groups. Rural areas, around Mysore urban agglomeration are influenced by urbanization and are in a phase of socio-economic and epidemiological transition. Due to the long-term consequences, the cost burden of obesity on the health care system is enormous.[2] A better understanding of the numbers and causes can help overcome barriers to the primary prevention of obesity for youth and adults in community

Material and Methods

A population based Cross-sectional study was carried out at Hadinaru, Nanjangud taluk, Mysore district, Karnataka state, south India. Data collection was carried out from July 2007 to May 2008.

According to NFHS 2 survey, prevalence of overweight or obesity in rural area rose from 2% (1989) to 17% (2003), hence we took 10%, the median value of prevalence to calculate the sample size at 5% level of significance with a relative allowable error (d) of 15% on the prevalence of overweight or obesity, using the formula $Z_{)2.á03!*}{}^{2}pq/d^{2}$. Sample size calculated was 1600 for the study.

Household was considered as a sampling unit. An average of three adults was expected in each household and to interview 1600 adults, around 535 households had to be selected. A non response of 10%, in the form of locked houses was expected during the survey and finally 600 households were intended to be studied. As per 2001 census, there were 1200 households in the village, to select 600 households, systematic random sampling technique was used and every alternate house in each lane was selected and persons aged 18 years in the selected household were included in the study. Individuals who had i) Severe chronic illness ii) Physical disability iii) Mental disability and pregnant women were excluded from the study. A total of 484 households were covered and 1423 persons were interviewed (90% response rate). Reasons for non response were locked houses, individuals who had been to work at the time of interview, who had been to a relative's house in a different village and individuals who refused to participate in the study.

Ethical clearance was obtained from the Institutional ethical committee before the initiation of the study. Informed consent was obtained from each study participant.

Data was collected by personal face to face interviews, using a predesigned questionnaire. Questionnaire included details on individual's socio-demographic characteristics, information on risk factors for obesity. Current history of hypertension/diabetes, alcohol consumption pattern, fat consumption pattern and physical activity status was obtained from each individual.

B G Prasad modified classification was used to assess the socio-economic status of the rural population, which is based on the per capita income per month.[3]

Physical activity was assessed and classified as sedentary, moderate and rigorous activity. Sedentary activity was defined, if the individual was doing routine activities and /or doing less

than 2 hours of moderate activity per day and with no active exercise or walking (e.g. job involving desk work, mainly doing domestic activities, viewing television or reading, woman having a servant for washing and cleaning purposes). Moderate activity, if the individual was doing activities like office work, walking to the field, walking for half an hour every day, cooking with the help of motorized equipment, gardening, feeding cattle for 2-8 hrs and doing less than 2 hours of rigorous activity per day. (e.g. home maintenance activities like cooking, sweeping and mopping the floor, gardening, feeding cattle or livestock, washing linen/cloth by hand, carrying firewood, drawing water from well etc). Rigorous activity, if a person was doing activities like manual labour without the help of motorized equipment, lifting and transport of heavy weight objects etc. for more than 2 hours per day or doing moderate activity for more than 8 hours per day. (Example: agricultural work in fields, pulling a cart or rickshaw, quarry work, cycling, rowing, carpentry, masonry, women doing their household activities as well as working in field or at construction sites or doing cleaning and washing in other's houses etc).

Based on the visible fat consumption/ person/month, the individuals were grouped into either as consuming more than 1 kg of visible fat or otherwise.[4,5]

Height was measured to the nearest 0.5 cm, with the subject standing erect without foot wear, with gaze horizontal, on which the scale was marked with the measuring tape. Body weight of the study subject was measured, to the nearest 0.5 kg using a standard Krupp's weighing machine. Subjects were instructed to wear minimal clothing (as culturally appropriate) and no footwear while their weight was being measured. Cut off levels for overweight and obesity were taken as Body Mass Index "> or =" 23 and "> or =" 25 respectively. (WHO Asia Pacific guidelines).[4] A standard mercury sphygmomanometer (Diamond Co. BP Apparatus, Pune, India) was used for recording the blood pressure. Hypertension was defined if Systolic Blood Pressure was "> or =" 140 mm of Hg and/or Diastolic Blood Pressure "> or =" 90 mm of Hg,

Table 1: Prevalence of Overweight and Obesity among Adults in Relation to their Socio Demographic Characteristics

Characteristics	Total n=1423	Overweight [%]	Obese [%]	p value
Age				
18-24yrs	243	22 [9.1]	5 [2.1]	
25-34yrs	323	40 [12.4]	24 [7.4]	
35-44yrs	286	42 [14.7]	38 [13.3]	<0.001
45-54yrs	227	35 [15.4]	37 [16.3]	
55-64yrs	176	30 [17.0]	30 [17.0]	
>65yrs	178	20 [11.9]	30 [17.9]	
Sex				
Female	713	86 [12.1]	85 [11.9]	0.003
Male	710	103 [14.5]	79 [11.1]	
Education				
Illiterate	744	89 [12.0]	73 [9.8]	
<10yrs of schooling	487	64 [13.1]	70 [14.4]	0.005
>10yrs of schooling	192	36 [18.8]	21 [10.9]	
Occupation				
Professional	44	11 [25]	12 [27.3]	
Agriculturist	242	43 [17.8]	31 [12.8]	<0.001
Skilled	63	9 [14.3]	5 [7.9]	
Laborer	343	31 [9.0]	17 [5.0]	
Housewives	500	72 [14.4]	66 [13.2]	
Businessmen	67	10 [14.9]	11 [16.4]	
Students/ Unemployed	164	13 [7.9]	22 [13.4]	
Socio-economic status				
Class I	121	29 [24.0]	36 [29.8]	
Class II	138	26 [18.8]	26 [18.8]	
Class III	401	63 [15.7]	51 [12.7]	<0.001
Class IV	484	52 [10.7]	42 [8.7]	
Class V	279	19 [6.8]	9 [3.2]	

Table 2: Prevalence of Overweight and Obesity According to Dietary Characteristics

Characteristics	Total n=1423	Overweight [%]	Obese [%]	p value
Diet				
Vegetarian	976	148 [15.2]	13 [13.4]	<0.001
Mixed	447	41 [9.2]	33 [7.4]	
Oil quantity				
>1kg/month/person	527	106 [20.1]	103 [19.5]	<0.001
<1kg/month/person	896	83 [9.3]	61 [6.8]	
Type of oil				
Palm oil	276	31 [11.2]	25 [9.1]	
Sunflower oil	544	88 [16.2]	94 [17.3]	<0.001
Ground nut oil	38	2 [5.3]	2[5.33]	
Mixed	565	68 [12.0]	43 [7.6]	
Frequency of bakery food intake				
Daily	20	3 [15.0]	6 [30.0]	<0.001
Once a week	362	73 [20.2]	65 [18.0]	
Occasionally	1041	113 [10.9]	93 [8.9]	
Alcohol intake				
No	1292	170 [13.2]	148 [11.5]	0.948
Yes	131	19 [14.5]	16 [12.2]	

and/or on treatment with antihypertensive (JNC VII criteria).

Data analysis was performed using Epi-info software Version 3.5.3. Overall prevalence of obesity and prevalence rate (in %) for each of the factors was estimated. Statistical significance was evaluated at 5% level of significance utilizing chi-square test. Multiple logistic regression analysis was performed with obesity as the dichotomous outcome variable (dependent variable) and age, type of occupation, socio-economic status, fat intake, history of current diabetes mellitus and hypertension and physical activity as independent variables.

Results

Overall prevalence of overweight and obesity was 13.2% and 11.5% respectively. Age wise the prevalence of both overweight and obesity was high among older age group i.e. 17% overweight among 55-64 age group and 17.9% obese among >65 years. Least prevalence of both overweight (9%) and obesity (2%) was seen among 18-24 age group. Prevalence of overweight was more among males (14.5%) than females (11.9%). Prevalence of obesity was high among professional adults (27%) and least among labourers (5%). A significant positive correlation of was observed with socio-economic class and prevalence of overweight and obesity. (Table 1)

Higher prevalence of overweight and obesity was observed among vegetarians, adults consuming more than 1 kg oil per month, adults consuming sunflower oil and those who daily consumed bakery products. (Table 2)

Higher prevalence of both overweight and obesity was observed among those adults who had history of diabetes (25.7%, 48.6%) and hypertension (20.7%, 33.8%). Our study showed the inverse relation between level of physical activity and prevalence of overweight and obesity. (Table 3)

The independent factors associated with the prevalence of overweight/obesity were

Table 3: Prevalence of Overweight and Obesity According to Clinical Characteristics and Physical Activity

Characteristics	Total n=1423	Overweight [%]	Obese [%]	p value
H/O of Diabetes				
No	1388	180 [13.0]	147 [10.6]	<0.001
Yes	35	9 [25.7]	17 [48.6]	
H/O of Hypertension				
No	1210	145 [12.0]	92 [7.6]	<0.001
Yes	213	44 [20.7]	72 [33.8]	
Physical activity				
Sedentary	500	70 [14.0]	103 [20.6]	
Moderate	510	79 [15.5]	47 [9.2]	<0.001
Rigorous	413	40 [9.7]	14 [3.4]	

Table 4: Multivariate Correlates of Obesity

Characteristics	Unadjusted Odd's ratio 95%CI	p value	Adjusted Odd's ratio 95%CI	p value
Age				
18-24yrs				
25-34yrs	0.29 [0.17-0.49]	0.001	1.03 [0.45-2.39]	0.929
35-44yrs	0.58 [0.38-0.89]	0.014	1.54 [0.79-3.02]	0.202
45-54yrs	0.91 [0.60-1.39]	0.684	2.30 [1.23-4.30]	0.009
55-64yrs	1.09 [0.71-1.69]	0.677	1.73 [0.95-3.15]	0.073
>65yrs	1.22 [0.77-1.92]	0.390	1.78 [0.99-3.20]	0.052
Occupation				
Student/unemployed				
Professional	4.03 [2.00-8.12]	0.000	3.12 [1.36-7.14]	0.007
Agriculturist	1.62 [1.02-2.57]	0.04	1.58 [0.86-2.9]	0.143
Skilled	1.05 [0.52-2.12]	0.885	1.61 [0.71-1.9]	0.26
Laborer	0.60 [0.37-.97]	0.03	1.49 [0.83-2.7]	0.23
Housewives	1.40 [.92-2.14]	0.114	2.12 [1.2-3.8]	0.00
Business	1.68 [.89-3.18]	0.109	1.40 [0.66-2.9]	0.38
Socio-economic status				
Class V				
Class I	10.40 [6.12-17.66]	<0.001	2.30 [1.03-5.13]	0.041
Class II	5.42 [3.22-9.12]	<0.001	1.85 [0.94-3.62]	0.072
Class III	3.56 [2.27-5.56]	<0.001	1.67 [0.97-2.89]	0.062
Class IV	2.16 [1.37-3.39]	0.001	1.56 [0.95-2.55]	0.073
Education				
>10yrs of schooling				
Illiterate	0.65 [0.46-0.94]	0.022	0.3 [0.1-1.4]	0.98
<10yrs of schooling	0.89 [0.62-1.29]	0.571	1.8 [0.78-1.93]	0.07
Diet				
Vegetarian				
Mixed	2.01 [1.51-2.68]	<.001	1.36 [0.93-1.99]	0.106
H/O of Diabetes				
Yes				
No	0.10 [0.04-0.23]	<0.001	0.26[0.10-0.66]	0.005
H/O of hypertension				
No				
Yes	4.91 [3.62-6.65]	<0.001	0.41[0.17-0.96]	0.042
Frequency of bakery food intake				
Occasionally				
Daily	3.31 [1.35-8.10]	0.009	0.64 [0.21-1.90]	0.426
Once a week	2.49 [1.92-3.24]	<0.001	1.24 [0.79-1.94]	0.347
Physical activity				
Rigorous				
Sedentary	3.51 [2.50-4.94]	<0.001	1.84 [1.13-2.99]	0.013
Moderate	2.18 [1.53-3.09]	<0.001	1.55 [0.98-2.45]	0.061
Oil quantity				
<1kg/month/person				
>1kg/month/person	3.43 [2.67-4.40]	<0.001	1.50 [1.03-2.17]	0.032

identified by performing multivariate logistic regression analysis. Multivariate logistic regression model showed that 45-54 age group (OR 2.30, 95% CI 1.23-4.30), professional adults (OR 3.12, 95% CI 1.36-7.14), class I socio-economic class (OR 2.30, 95% CI 1.03-5.13), increased oil intake (OR 1.50, 95% CI 1.03-2.17), sedentary physical activity (OR 1.84, 95% CI 1.13-2.99) were independently associated with the prevalence of overweight and obesity among rural adults. (Table 4)

Discussion

Overall prevalence of obesity was 11.5%; with marginally higher prevalence in females i.e. 11.9% than males 11.1%, whereas the prevalence of overweight was higher in males 14.5%than females 12.1%. In contrast, a study among Bengalee women by Mithu Bhadra *et al*[6] showed a higher prevalence of 17.45% of obesity and 37.42% of overweight. A study by Venkatramana *et al*[2] among rural population of Andhra Pradesh showed a prevalence of obesity among females (2.7%) than males (1.03%) and higher prevalence of overweight among males (13.3%) than females (9.7%), which is similar to our study. After puberty both males and females display a marked increase in appetite for fat, but the rise is much earlier and to a greater extent in females, which

increases their risk of becoming obese. Prevalence of obesity increased from 2% in 18-24 years age group to 17.9% in >65 years age group. This linear relationship between age and prevalence rate of obesity was also seen by N Gopinath *et al*.[7] The prevalence of obesity had an inverse relationship with level of education in the present study. This may be attributed to education which brings awareness about diet and consequences of obesity. Haq Nawaz *et al*[8] found that 33% of below high school level educated subjects, 27% of high school educated subjects and 23% above high school (college) educated subjects were overweight. But as per NFHS-2, prevalence rate of obesity in females increased with higher educational status.[9] This can be attributed to sedentary lifestyle which most of the educated and working class women follow. In a study of obesity among north Indian women by Agrawal *et al*[10] it was found that women working as professional/ technical/managers were more prone to be overweight and obese than those working in other fields, which was similar to the present study.

A significant correlation of higher socio-economic class and prevalence of overweight and obesity among rural adults was the striking factor in our study. Various research studies by Singh *et al*,[11] Griffiths and Bentley *et al*,[12] Dhurandhar and Kulkarni *et al*,[13] on obesity in India have found prevalence to be higher among economically betteroff persons. A higher prevalence of overweight among high-socio economic group has been postulated to be linked to cultural norms that may favour fat body shapes.[14] Cultural practices concerning food and physical activity are also possible explanations for the higher BMI among high-socio economic group. It has been shown that higher income groups in India consume a diet containing 32% of energy from fat compared with 17% in lower-income groups.[15] It is possible that high-socio economic status women in India still face multiple barriers to engage in physical activity and healthy eating habits despite having more knowledge about healthy food, healthy behaviour and resources.[12]

Sedentary activity resulted in higher prevalence of overweight and obesity in our study. "The surgeon general's report on physical activity and health"[16] mentioned that "low levels of activity, resulting in fewer calories used than consumed, contribute to high prevalence of obesity". Sedentary work demands considerably less energy when compared to moderate work, if calorie intake remains higher than the requirement a positive energy balance occurs, if it persists for long term can lead to weight gain. Anita P Naidu *et al* also found that, obesity was relatively more in the subjects doing sedentary work, they observed that 95% of male obese and 96% of female obese subjects were sedentary workers.[17]

Food habits are the way in which individuals or groups of person responses to social and cultural pressures, choose, consume, and make use of available foods.[18] As populations become more westernised, dietary composition changes to include more saturated fat and less fibre.

Higher prevalence of overweight and obesity among known diabetic and hypertensive subjects in the study matches with the observations made by N Gopinath et al and Haq Nawaz.[7,8] Swami *et al*[20] found that prevalence of hypertension was 82.5% among overweight elderly in comparison to 45.8% among non-overweight.

High socio-economic status, physical activity and dietary habits are the significant factors for positive change in the BMI status of adults, by logistic regression results which matches the result of other studies.[11,17]

Conclusion

One fourth of the rural population in Mysore are either overweight or obese. High socio-economic status of an individual determines the food pattern and physical activity of the rural adults and thereby their high BMI status. A behavioural change communication is essential for the rural people so that they adopt a physically active lifestyle and thus reduce obesity related morbidities.

References

1. World Health Organization (2000). Obesity: preventing and managing the global epidemic. *WHO Tech Rep Series 894*.
2. Venkatramana P, Chandrasekhar Rao P, Annaiah P, Madhavi P, Chengal Reddy P. Prevalence of Overweight and Obesity among the Rural Populations of Andhra Pradesh. *Human Ecology Special.* 2005; 13: 111-14.
3. The All India Consumer Price Index. Available from: http://www.bulletin. rbi.org.in. Accessed on 26/04/2008.
4. Hypertension study group. Prevalence, awareness, treatment and control of hypertension among the elderly in Bangladesh and India. A multi-centric study. *Bulletin of WHO.* 2001; 79(6): 490-500.
5. William D McArdle. Energy, Nutrition and Human Performance: *Exercise Physiology*, 3rd edition. Malvern, USA: Lea and Febiger; 1991, 64-69.
6. Mithu Bhadra, Ashish Mukhopadhyay and Kaushik Bose. Overweight and Obesity among Adult Bengalee Hindu Women of Kolkata, India. *Human Ecology.* 2005; 13: 77-83.
7. Gopinath N, Chadha SL, Jain P, Shekhawat S, Tandon R. An epidemiological study of obesity in adults in the urban population of Delhi. *J Assoc Physicians India.* 1994; 42(3): 212-15.
8. Haq Nawaz, Adams ML, Katz DL et al. Weight loss counselling by health care providers. *Am J Public Health.* 1999; 89(5): 764-767.
9. National Family Health Survey-2 (1998-99); International Institute for Population Sciences, Mumbai, India.
10. Agrawal P and V Mishra. Covariates of overweight and obesity among women in North India. *East West Center Working Papers*, *Population and Health Series.* 2004; 116.
11. Singh RB, R Beehom, SP Verma, M Haque, R Singh, AS Mehta, *et al*. Association of dietary factors and other coronary risk factors with social class in women in five Indian cities. *Asia Pacific Journal of Clinical Nutrition.* 2000; 9 (4): 298–302.
12. Griffiths P, Bentley M. Women of higher socio-economic status are more likely to be overweight in Karnataka, India. *Eur J Clin Nutr.* 2005; 59: 1217–20.
13. Dhurandhar NV and PR Kulkarni. Prevalence of obesity in Bombay. *International Journal of Obesity and Related Metabolic Disorders.*1992; 16(5): 367–375.
14. Sobal J, Stunkard AJ. Socioeconomic status and obesity: a review of the literature. *Psychol Bull.* 1989; 105: 260–75.
15. Shetty PS . Nutrition transition in India. *Public Health Nutr.* 2002; 5: 175–82.
16. The Surgeon General's Report on Physical Activity and Health (USA, 1996).
17. Anita P Naidu, Mushtari Begum J. Demographic profile and food behaviour in selected obese adults. *The Ind J Nutr Diet.* 1993; 30: 154 -58.
18. Mead M. Cultural change in relation to nutrition. *Burgess and Lane.* 1962; 50-62.
19. Taylor R, J Badcock and H King. Dietary intake, exercise, obesity and non communicable disease in rural and urban populations of three Pacific Island countries. *J Am Coll Nutr.* 1992; 1: 283 - 293.
20. Swami HM, Bhatia V, Gupta AK, Bhatia SPS. An Epidemiological Study of Obesity Among Elderly in Chandigarh. *Indian Journal of Community Medicine.* 2005; 30(1):1-5.

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Original Article

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Situational Analysis, District Kangra, Himachal Pradesh, India: A Public Health Report

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Abstract

This is a public health report which analyses the district Kangra, right from the difficult geography and topography of the district to stabilizing population profile with increasing geriatric population to expanding laboratory linkages to NICD and PGIMER, Chandigarh to existing insufficient human resources and key public health problems and to compare the present health status indicators with the millennium development goals.

Key Words: Public Health Report; MDGs; Nagarkot; Kangra.

Introduction

Himachal Pradesh is situated in the northwest corner of India. With her difficult topography and limited resources, she has managed to become the polio Free State for the last five years while the neighboring bordering states like Utter Pradesh, Haryana, Punjab, and Chandigarh are still harbouring the wild polio viruses. She has progressed far better than the country in terms of millennium developments goals developments like birth rate 20.5/1000 Population as against 25/1000 of the country; infant mortality rate 50/1000 live births as against 58/1000; couple protection rate 63% as against 54% of the country but lagging behind in exclusive breast-feeding, birth spacing methods and anemia. The leading burden of the diseases in the state falls in the category of chronic obstructive pulmonary disease, tuberculosis, acute respiratory infections, and diarrheas of infancy, which are the major areas of public health priorities.[1]

I was working as nodal officer (Integrated Disease Surveillance Project-IDSP) cum Integrated Child Development Scheme-sector advisor in the Kotkhai block of district Shimla-H.P prior to my joining Master in Applied Epidemiology-Field Epidemiology Training (MAE-FETP) course at National Institute of Epidemiology, (NIE_ICMR), and Chennai. I joined MAE-FETP course to acquire greater skill in epidemiology relevant to the public health practice. Having completed three months of 1st contact session at NIE, Chennai, I was assigned district Kangra at Dharamshala (Himachal Pradesh), IDSP cell for my field placement for which I reported to O/o CMO, Kangra in the last week of April, 2006.

The objectives of field training are:

1. To describe the health facilities available; the socio-cultural and disease profile of people within the district and state;

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2. To identify the major public health priorities and disease burden;
3. To compare the present health status indicators with the millennium development goals.

Materials and Methods

Data Collection/Data Sources

We discussed about the Field Epidemiology Training Program course (FETP) with the Chief Medical Officer, Kangra at Dharamshala and also about the various field assignments which we would undertake in two years. For collection of primary as well as the secondary data, we went to:

-Health branch in the office of Chief Medical Officer, Kangra at Dharmshala;

-Records and reports of the offices of Block Medical Officers/Senior Medical Officers of Shahpur and Kangra blocks;

-Laboratories of Microbiology and Pathology of Dr. Rajindera Prasad Medical College, Tanda (Kangra);

-Deputy Commissioner/Additional Divisional Magistrate offices;

-The offices of district statistical officer, Irrigation and public health (IPH), education, police;

-District census and election officer at Kangra and also, their corresponding head offices at Shimla either by phone or personal visits so as to know about the present health scenario, secondary data availability and the existing surveillance system of the district.[2]

Results

Himachal Pradesh is situated in the north-west corner of India right in the lap of the Himalayan ranges and is almost entirely mountainous with altitudes ranging from 350 to 6975 meters above the sea level. It has deeply dissected topography, a complex geological structure and a rich temperate flora in subtropical latitudes. The hilly state of Himachal Pradesh came into being as Union Territory on 15th April 1948 with integration of 30 princely states. The state is divided in to three zones, 12 districts; 51 sub divisions; and 75 blocks; and *3037* gram panchayats having 17495 villages.[3]

Geographic Profile

The state is located at latitude of 30°22'40" N to 33° 12'40" N and longitude of 75° 45'55" E to 79° 04'22" E. The altitude of state ranges from 350 meters to 6975 meters above mean sea level. The state has an area of 55,673 Sq. Kms. It constitutes 1.69% of India's area and 10.54% of the Himalayan Land mass.

This land locked state is bordered by Jammu and Kashmir in the North, Punjab and Haryana

Figure 1: Maps of Himachal Pradesh and Kangra

in the South West and Northern part of Uttaranchal in the South East. In the North-East, the state forms the international boundary with the Tibetan part of China. Shimla, which once was the summer capital of India, now serves the state capital. The average rainfall varies between 500 mm in Lahaul and Spiti to more than 3400 mm in Dharamshala. Out of 16997 villages in the state only 7867 are directly linked with the all weather roads. Total motorable road in the state is 20,270 kms out of which 7394 kms is metalled. Rail communication is restricted to only two narrow gauge lines connecting Shimla with Kalka (96 km) and Jogindernagar with Pathankot (113 kms) and one 16 kms broad gauge railway line from Nangal dam to Una. At present there are only three Airports namely Jubbar Hatti (Shimla); Bhuntar (Kullu) and Gaggal (Kangra) and about 54 operational helipads in the state. Given the scenic beauty of Himachal Pradesh, she is one of the wonderful states of the country.

Economic and Occupation

The economy of the Himachal Pradesh is dependant upon agriculture and its allied activities and any fluctuation in the agricultural production affects the growth rate considerably. The growth rate in the state was 7.5%. The GSDP at the current prices was estimated at Rs.17938 crores (2004-05) as against Rs. 16075 crores in 2002-03. Agriculture is the main occupation of the people, contributing 35.87% towards the state gross domestic product. Apple cultivation is of special significance for the economic emancipation of the people living in the higher hills of the state. With stone and citrus fruits growing sub-tropical and sub-humid areas, the state is known as Fruit Bowl of India.[4]

Population profile

The state has a population of 60, 77,900 (2001 census), density of the population is 109 persons per sq. km and ranges from 2 in district Lahaul and Spiti (L and S) to 369 in the district Hamirpur. The population of the state constitutes 0.59% of the India's population.[5] The majority of the population is rural (90.2%).

Table 1: Characteristics of the population of Kangra, Himachal Pradesh

Health indicator	Kangra	Himachal Pradesh	India
Total Population	1339030	6077990 (census 2001)	1028737436
Males	661254	3087940	532223090
Females	677776	2989960	496514346
Population density	233 per sq. km	109 per sq. km	325 per sq. km
Urban population	72285 (5.4%)	595581	286119689
Rural population	1266745 (94.6%)	-	-
Sex ratio	1025	968	933
Age			
0-4 years	123191 (9.2%)	560187	NA
5-14 years	290569 (21.7%)	1324203	NA
15-29 years	380284 (28.4%)	1727160	NA
30-44 years	258968 (19.34%)	1176006	NA
45-59 years	171395 (12.8%)	730264	NA
60+ years	123324 (9.21%)	560280	NA
Population above poverty line	224282 families *5(72%)	-	-
Population below poverty Line	64903 families*5 (28%)	-	-

Source: Directorate of Health Services, Shimla, (Himachal Pradesh)

Most of the villages have less than 500 persons (81.5%). The sex ratio is 968 females per 1000 males. Himachal Pradesh has a large area under tribal belt, which covers two districts of Lahaul and Spiti and Kinnour and also Bharmour and Pangi development blocks of Chamba district. (Table 1)

Kangra District Profile- Demographic Information

District Kangra with an area of 5739 sq. km is the biggest in the population covers 22.03% of the total population of the state. Geographically, boundary of this district touches in the east with Kullu and Mandi; in the south with Hamirpur district; in the south-west Una and Hoshiarpur district in the North West-with Gurdaspur district (Punjab). District Kangra lies on 75*35'34"-77*04'4.6" East longitude and 31*41'0"-32*28'05" North latitude. The height of district Kangra is 500 to 5500 meters from the sea level.

Kangra valley derives its name from Kangra town, which was called Nagarkot in the ancient times. Dharamshala's altitude varies between 1,250 meters (4,400 ft) and 2,000 meters (6,460 ft). Since 1960, when it became temporary headquarter of the Dalai Lama, Dharamshala has risen into international repute as "The Little Lhasa in India"- http://www.tibet.net. (Figure 1)

Laboratory Facilities, Linkages and Networking

Availability of adequate laboratory support in terms of existence and adequacy is a pre requisite for successful implementation of any national programme in any given area. It also serves as an integral part of the surveillance system. For example, the laboratories are very much involved in the diagnosis of a disease and tracing the source of infection. It plays a vital role in the early detection of an outbreak. The other services include detection of new disease agents, quality control of biological and to find out natural foci of infection like Plague in Shimla (Rohru). Laboratory has become the basis upon which the lines of the treatment, control of the diseases as well as the preventive measures are conveniently decided. The laboratory networks are ideally at four levels of functions. These are (a) peripheral laboratories and microscopic centers (b) district public health laboratory (c) disease based state laboratories and (d) reference laboratories and quality control laboratories. The objectives of this exercise are to:

1. Identify and describe the existing laboratory facilities in Kangra District;
2. Identify the lacunae (if any)
3. Suggest recommendations to bridge the identified gaps.
4. Establish networking links with other state level laboratories and referral laboratories during routine as well as epidemic situation.

There are fourteen blocks, which in turn, have a total of seventy-eight primary health centers and 13 community health centers and 438 sub centers. There are seven government civil hospitals, one zonal hospital, one medical college and one Ayurvedic College at Paprola. (Table 4). We identified four laboratories primarily. Of these two were at different peripheral level namely, laboratory of Ichhi primary health center and laboratory of Chamunda community health centre. The third was the laboratory of Civil Hospital, Kangra, (District Hospital) functioning at district level and fourth reference laboratory was with Doctor Rajendra Prasad Government (DRPGM) College Hospital, Dharamshala. We visited all four laboratories and had a talk with the laboratory technicians and medical officer or pathologist-in-charge. We identified the resources in terms of manpower and equipments. We went through the records and registered maintained at the laboratories to get a better understanding on processes. We also identified the various tests that are done at the primary (first level) and secondary (referral) level.

Laboratory setting is available at the three-district hospital, five sub-division hospitals, fourteen community health centers and twenty-eight primary health centers. Besides these, there are several private laboratories in the urban and semi- urban areas of the district. Investigation facilities provided were examination of blood, urine, stool, malarial parasites, sputum for AFB and others at primary, secondary and tertiary level laboratories. Laboratories at the district hospital and sub divisional hospitals are manned with pathologist and laboratory technicians. Laboratory technicians are running laboratories at block level/PHC level. Staff pattern (as rationalized) in these laboratories is as below:

1. Primary Health Center – One laboratory Technician.
2. Community Health Center - Two laboratory Technicians
3. Civil Hospital - Two laboratory Technicians
4. District Hospital - One microbiologist

Twelve Laboratory Technicians

External and internal quality control measures were taken as per guideline of different national programme (e.g. sending

Table 2: Key public health priorities in Kangra, Himachal Pradesh

Public health priority	Key elements	Ongoing prevention and control programme
Respiratory diseases, inclusive of COPD, ARI etc.,	• Unhygienic and overcrowding of the houses due to wintry conditions. (Over25% prevalence) • Burning of wood as fuel in houses.	• Proper sanitation • Routine immunization/ Nutrition • School health proper programme.
Diarrheal & dysentery diseases	• 6.1% prevalence mostly in the rural areas • Unhygienic practices of defecation	• Combat team created in every PHC • IDSP in action • Problematic village / areas identified.
Tuberculosis	• High prevalence in the slum areas	• RNTCP in action • DOTS implemented
Iron deficiency anemia	• Over 30% of the prevalence, esp., in the women.	• RCH programme • Parasitic disease control • Iron fortified foods & dietary modification.

blood smears for cross checking to designated state/central government laboratory in national anti malaria programme and cross checking of sputum smear by the supervisors in revised national tuberculosis control programme). Our labs are not equipped to combat the diseases of epidemic potential like measles and dengue and inter sectoral co-ordination with the powerful private sector is also one of the identified lacunae. Institutional linkage facilities for laboratory are available from Dr. Rajinder Prasad Govt. Medical College, Kangra at Tanda and Indira Gandhi Medical College, Shimla for the district hospitals and networking facilities are available with Central Research Institute, Kasauli; PGIMER, Chandigarh and other institute of National Importance is National Institute of Communicable Diseases 9NICD), New Delhi.

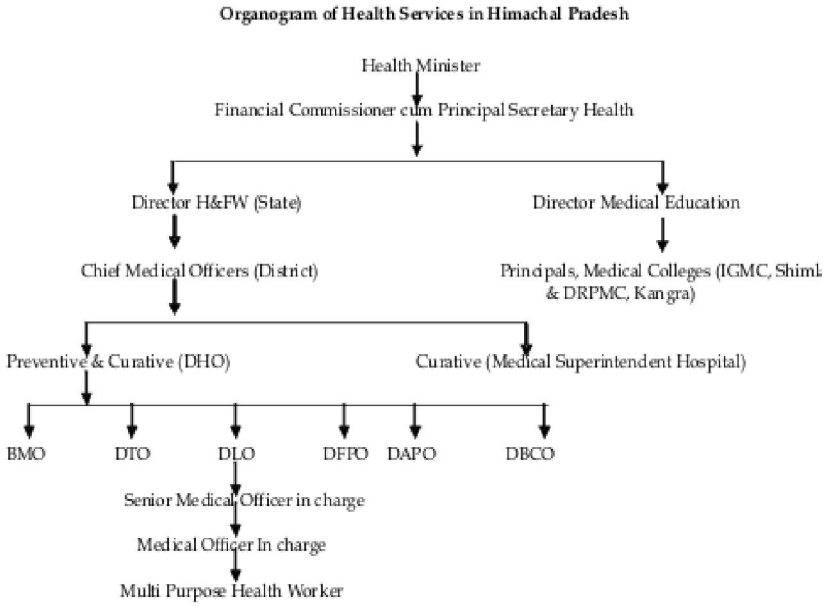
Major public health priorities

The public health problems in the district related with maternal conditions, communicable diseases, non-communicable diseases and injuries. Important communicable diseases were acute respiratory tract Infection (including pneumonia), tuberculosis, chronic obstructive pulmonary disease, acute respiratory infections and diarrheal diseases and geriatric ailments. Exclusive breast-feeding, birth spacing methods and iron deficiency anemia are the areas, which need special attention in the light of the National Rural Health Mission (NRHM). The district is famous for the world known divine places in Kangra and also Dharamshala for Dalai Lama. There are important tourist centers and therefore, they attract good number of tourists round the year and their presence may be the causes for high prevalence of HIV/STDs. Iron deficiency anemia (30%), respiratory diseases (25%), acute diarrheal diseases (6%) and tuberculosis are the three public health priorities in Kangra district (Table 2).[3] There is no public and private networking going on.

Organization of the Health System

Unlike in West Bengal and other states of India where we have the clear-cut division of the two cadres of the health services, i.e., public health cadre specialists and clinicians, but in Himachal Pradesh, both are in one line and therefore, the chances of clashes are obvious. The health ministry is responsible for framing and developing the various health programmes in the state. Principal Secretary of health is responsible for implementing the ministry decisions as well as appointing authority for doctors. Directorate health services are concerned with getting decisions implemented by the districts through their officers and reporting the activities above and downwards. Chief medical officer heads the district and is responsible for implementing various programes in his district. In the process, the

Table 3: alth human resource profile



BMO (Block medical officer); DHO (District health officer); DTO (District tuberculosis officer); DLO (District leprosy officer); DFPO (District family planning officer); DAPO (District AIDS programme officer); DBCO (District blindness control officer)

various program officers help him and block medical officers are responsible for the blocks.

These program officers are responsible for implementing their respective programs in the district and maintaining the records. They are responsible for transmitting the data both ways, that is, to the State Head Quarter (HQ) and to the Peripheral Blocks, thus developing a networking between the State HQ and the peripheral units for reporting and other activities. At the tehsil level and the sub-tehsil level are the Block HQ which is headed by the block medical officer under whom are the civil hospitals, community health centers, primary health centers, civil dispensary and sub-centers. The most peripheral worker is the multipurpose health worker who is the peripheral unit of health manpower responsible for actual implementation of all the national programs (Table 3) while the staff position and medical institutions have been summarized in the tables 4 and 5.

Table 4: Medical institutions with number of beds available as on 31/03/05

District	Hospitals	CHCs	PHCs	CDs	Sub-centers	Beds
Bilaspur	2	5	27	2	117	385
Chamba	4	7	40	0	169	611
Hamirpur	2	5	24	0	152	434
Kangra	8	13	78	2	434	1462
Kinnour	2	3	17	0	33	226
Kullu	2	5	17	0	35	136
Lahaul & Spiti	1	3	14	0	35	136
Mandi	6	9	59	0	311	1110
Shimla	11	6	77	9	260	2174
Sirmour	5	3	34	5	148	604
Solan	5	3	32	5	178	921
Una	2	4	20	1	131	369
Himachal Pradesh	50	66	439	22	2068	8824

Since inception of National Rural Health Mission, (NRHM) health becomes joint responsibility of General Administration, Health department and Panchayat department. At district level the District Health and Family Welfare Samiti has been formed where Sabhapati is the Kangra Zilla Parishad as Chairperson, District Magistrate of Kangra is the Vice-Chairperson and chief medical officer is the member secretary. It was the highest body to look after the different public health activity including all National Health programmes. DRPGMC, Kangra at Tanda staff is working with the help of the state personnel from the various sections. They are likely to be shifted and in the month of December 2006 to Kangra. Civil hospitals like Palampur, Nurpur, Kangra etc., are made the Model Hospitals of the state. According to NFHS-1 (1992), median distance

Table 5: Consolidated staff position of district Kangra as on 30TH April, 2006

Sr. no.	Category of post	Sanctioned	In position	Vacant	Surplus
1.	C.M.O.	1	1	0	-
2.	Medical officers	212	192	26	6
3.	Medical officer(Dental)	23	18	05	-
4.	MEIO	1	Nil	1	-
5.	Distt. food inspector	1	1	0	-
6.	Drug inspector	1	1	0	-
7.	Assitt. Malaria officer	3	1	02	-
8.	Assitt. Leprosy officer	1	0	1	-
9.	Staff nurse	156	112	44	-
10.	Public health nurse	2	nil	2	-
11.	Trained Dai	2	0	2	-
12.	Family planning Field worker	1	1	0	-
13.	Health educator	17	6	11	-
14.	Pharmacist	144	112	32	-
15.	Sr. Lab. Tech.	76	55	21	-
16	Female health supervisor	99	83	16	-
17.	Female health worker	450	450	0	11
18.	Male health supervisor	68	55	13	-
19.	Male health worker	438	273	165	-
20.	Class-IV	224	160	64	-
21.	Sweepers	105	89	16	-

of a sub-center and PHC is 3.5 and 6.9 kms. (Table 6)

In Indian System of Medicine (ISM), a separate department for ISM and H exists in the state which accommodates 1118 ayurvedic dispensaries and 3 unani and 14 homoeopathic dispensaries. The other sectors linked with health in the state are Integrated Child Development Scheme (ICDS) providing services to the pregnant and lactating mothers to the 14 blocks with 1423 Anganwari workers. The Irrigation and Public Health depart. is providing 80% of the drinking water through "gravity water supply scheme" to the state.

Indicators towards the Millennium Development Goals

When we observed the indicators of the millennium development goals (MDGs), we identified that Kangra is the hot spot for HIV/ AIDS cases followed by Hamirpur district, being the bordering district to Punjab. And the cases of the malaria are also on the rise in the Indora belt near to Punjab where the Annual Parasite Index (API) rises above two. High literacy rate and per capita income are 76.7% and Rs. 24,903/- in Kangra as against 64.9% and Rs. 20,989/- in HP is worth remarking.

Table 6: Distance from the nearest health facility

Distance	Sub-Center	PHC	PHC or Sub-Center	Hospital	Dispensary /Clinic	Any health Facility
Within village	14.9	3.3	17.8	-	14.5	28.8
Less than 5 Kms.	44.5	23.4	51.6	-	51.1	55.7
5-9 Kms.	17.6	35.5	22	18.8	21.7	14.2
10Kms.	13.5	38.6	8.4	63.3	10.6	1.3
Median Distance (Kms.)	3.5	6.9	2.9	15.9	3.5	2.2

Source: Directorate of health services HP

Table 7: Indicators of progress for the Health related Millennium development goals, (Kangra), India, 2005

Value of the indicator

Goal	Indicator	Kangra (Year)	State (Year)	India (Year)
Goal 1	Prevalence of the underweight children<5 years of age	60.8% (NFHS-3)	36%	46% (NFHS-3)
	Proportion of the population below minimum level of dietary energy consumption.	15.5%	12.5%	21%
	%age of children 6-59 months of age who received the 1st dose vitamin-A in the past six months.	95%	102.83%	29.7(1999)
	Proportion of the infants under six months who are exclusively breast fed.	99%	NA	55.2 (1999)
Goal 4.	Under-five mortality rate	14	14.4	17.8
.	Infant mortality rate	20 (NFHS-3)	36-49	57-58 (NFHS-3)
	Measles immunization among children under one	103.83%	95.5%	58 (NFHS -3
Goal 5.	Maternal mortality rate	255	287	301
	Proportion of births attended by the skilled health personnel.	80%	90% (2005)	42.5 % (2001
	Contraceptive prevalence rate	95%	104.75%	48.2
	%age of women receiving antenatal care.	80%	94.45%	41.3(98-99)
Goal 6. (HIV)	HIV prevalence among 15-24 years old pregnant women.	0.25-0.5 %	NA	NA
	Condom use rate of the contraceptive prevalence rate	5.6%	6.0 %	4.8%
	Number of children orphaned by HIV/AIDS.	Nil	NA	1.2 million
	%age of the people using a condom during most recent higher risk sexual encounter.	3.4%	5 %	NA
	%age of STI clients who are diagnosed and treated according the guidelines.	About 6000 clients last year (80.5 %)	90%	NA
	%age of HIV positive women receiving anti-retroviral treatment during pregnancy to prevent mother to child transmission of HIV.	Nil	NA	84.5 % (200B
Goal 6	Malaria death rate (per lac)	Nil	Nil	0.09
(Malaria)	Proportion of the people with uncomplicated malaria getting correct treatment at the health facility and community levels, according the national guideline, within 24 hrs of the onset of symptoms.	NA	NA	NA
	%age of women pregnant women who have taken chemoprophylaxis or drug treatment for malaria.	Nil	NA	NA
	The proportion of the households having at least one insecticide treated bed nets	Nil	0.05%	NA
Goal 6 (TB)	Prevalence and death rate associated with tuberculosis	ARI-1.9%(258/lac/yr) DR-3-5%	1.9 % DR-4% in NSP cases	1.5% DR-4-5 %in NSP cases
	Proportion of the TB cases detected & cured under DOTS.	68% 87%	78% 88%	66% 84%
	%age of estimated new smear positive TB cases registered under DOTS approach	98%	91%	93%
Goal 7	Proportion of population with sustainable access to improved water source, urban and rural.	NA	91% (2006)	77.9 % (2006
	Proportion of urban population with access to improved sanitation.	28%	29%	30% (2006)
Goal 8	Proportion of population with access to affordable essential drugs on a sustainable basis.	35% (2006)	34% (2006)	NA

DR-Death rate; **ARI**-Annualized Risk of Infection rate; **NSP-**New slide positive

Decennial growth rate for the decade 1991-2001 is +17.54 as against the country rate that is +21.34. This is one of the remarkable features of the health and family welfare programs of the state. (Table 7) No doubt, the majority of the MDGs of the district are excellent not only when compared with statistics of the state but also with the country.[6,7] All round good health indicators of the state, e.g., the state has succeeded to eliminate the leprosy and the current prevalence rate is 0.6/10,000 population of the state. In the Revised National Tuberculosis Control Program (RNTCP), the new case detection rate is 80% and the cure rate

is 88% to 89%-a successful implementation of the program.

The immunization coverage under Universal Immunization Program (UIP) is >97%. So far as Directly Observed Therapy–Short Course (DOTS) program in the district is concerned, the detection rate is 68% as compared to 75% of the prescribed and the defaulter rate and the failure rate need to be checked. Prevalence of the under weight children (69%) is again the gray area for the district. (Table 5)

But occasional outbreaks of Gastro Enteritis/measles/rubella despite over 100% reported immunization coverage in the far-flung areas of the district challenge the health system. Some health related millennium developments goals indicators were not available in the district like HIV prevalence among 15–24 years of all women in the state, condom use rate of the contraceptive prevalence rate, number of children orphaned by HIV/AIDS. Maternal aspect of the upper Himachal is bad so far as the institutional deliveries are concerned. Areas of the concern are due to the rough and tough topography of the state leading to untimely and difficult referral services. There is a need to establish a mechanism to ensure non-governmental health institutions delivering quality care to the desired level. There is a need for a dialogue between the private and public health sectors to avoid/reduce duplication of efforts and wastage of resources. 4% increase in the population of elderly people has resulted in increase in prevalence of Geriatric ailments including isolation and neglect of old.

Discussion

Kangra district had extreme climate, as Kangra proper is the plain area while the upper part Dharamshala is hilly and mountainous and extremely rainy, cold and snowy. So, in the latter part the respiratory ailments are in plenty in winter while in the plain area, the diarrheal upsets are quite common in the summer. Though agriculture is the backbone of economy but it is totally rain dependant. So, per hectare yield is less than the state average. Though the district as a whole is well connected and the literacy rate is over 80% in 14 lacs population of the district (22% of the total population of the state), yet poor economy, malnutrition, inadequate infrastructure support reflected to high prevalence of public health problems related to almost all public health diseases. Indicators of millennium development goals are one of the best in the country due to the spread of the government health care network into the peripheries and the people faith into it which has been and reflected in resultant decline in the disease profile.

As Kangra is also famous for the divine temples and tourism of Dharamshala attract many tourists, so the incidences of the HIV/AIDS cases are the highest in the state. The cases of the HIV/AIDS with the pulmonary tuberculosis are also detectable in the upper Kangra. Due to the lower socio-economic status of the people and living huddled into the single room in the wintry conditions, the cases of the pulmonary tuberculosis and the extra-pulmonary cases 9EPTB) are also on the rise.[8] The more detection of the EPTB cases in the Kangra district over 50% is the remarkable feature for the country. As 90% of the population resides in the rural areas, smoke produced by wood fuels may be another risk factor for prevalence of respiratory diseases in highest numbers. Inadequate treatment for acute conditions and chronic exposure to the risk factors leads to the prevalence of chronic diseases in such large numbers.

Water and Food Borne Diseases

This is the second largest cause of morbidity in the district. Natural water bodies like rivers, khads, nullahs, lakes and springs etc. are vital sources of drinking water supply. They are frequently exposed to contamination through pollutants during rainy seasons and winter as the tanks made for storage of water at the source are washed by the rains or disrupted because of the landslides or the pipes are frozen and broken at various places leading to contamination of the drinking water and possible explanation for the prevalence of diseases caused by water in such high numbers. Practicing unhygienic sanitary habits like

outdoor defecation in the cultivable lands, washing hand with mud after defecation and the most important is the ignorance about the mode of spread of these diseases are all possible risk factors.

Iron deficiency anemia and skin diseases

The climatic conditions are extreme with severe winter for five months and rainy season for many months next to Cherrapunji, forcing people to stay indoors clustered in a small room, which favors spread of skin diseases and as the nutritional status is also poor due to tough life style of the people in the mountainous areas. As proper personal hygiene is not practiced, may be because of extreme cold and lack of awareness, the skin diseases have a high prevalence of 31.56/1000 in 2005.

Wound and Injuries

Hilly terrain forces people to climb up and down for their livelihood. This exposes them to occupational injuries. Possible causes are slippery and narrow tracks, land slides, distant places of work, and poor means of communications.

In the district level some data were regularly generated but some data pertaining to the indicators of millennium development goals were not being generated and for this, some modifications were required in the forms (data collection instruments). In addition to this, analysis of the raw data were to be done at the level of block and district also so that the officer concerned can take appropriate measures at their own level as per the result of analysis. Data, which are generated regularly, is not computerized and installation of the computers at each block level can prevent wastage of time, money and manpower.

Existing peripheral laboratories at the primary health center level are capable of handling microscopic examination of sputum and blood smears. Peripheral laboratories needed minimal structural modification of the laboratory areas in the community health centres to perform these functions well along with routine examination of blood, urine and stool with some biochemical investigations. All of them were currently equipped with microscopes for performing microscopy for tuberculosis and malaria. But they are not equipped with any rapid diagnostic tools or any other reagents. The district public health laboratory needs to be constructed and strengthened as per the guidelines of the IDSP in the state for proper discharge of disease surveillance and outbreak control.[9]

Conclusions and Comments

There are many factors that influence the quality of health services, morbidity and mortality of people residing in the state of Himachal Pradesh. Some of them can be identified as following:

1. The state government has provided drinking water supply to approximately 90% villages and all urban areas. The quality of water however, needs to be kept under surveillance at pre-ensured acceptable standards to prevent water borne diseases, as they are the second largest cause of morbidity in the state.
2. Distribution of the primary health care facilities is uneven. Of the 3037 gram Panchayats, 400 are without primary health care facilities. The available centers are also haphazardly distributed thereby, creating difficulties for the rural folks to get the right line of treatment and further speedy referrals and subsequent follow-ups. Institutions located in comfortable areas are better staffed than those in rural and remote areas. This results in undue referrals and delayed treatments.
3. There is no urban primary health care setup in the state resulting in over-crowding in zonal, district and sub-district hospitals.
4. The existing primary health care facilities are under utilized because of ill-defined referral system. The secondary and the tertiary care centers, as a result are overcrowded. Human resource

development: There is a need of continuous medical education (CME) and in-service training of existing health manpower at different levels of the system.

5. Private sector: There is a need to establish a mechanism to ensure non-governmental health institutions deliver of quality care to the desired level. There is a need for a dialogue between the private and public health sectors to avoid/reduce duplication of efforts and wastage of resources.
6. Issues related to epidemiological-demographic transitions requiring urgent attention: Increase in age and prevalence of chronic diseases in the form of non-communicable diseases. Increase in the population of elderly people has resulted in increase in prevalence of Geriatric ailments including isolation and neglect of old.

   -Reproductive health of population: Gender issues affecting women resulting sexual exploitation, rape, domestic violence, unwed mothers, harassment of women at working places, and of course, widow related continuing problem.

   -Life style related problem:

   -Risky Behaviors: Teenage problems like premarital sex and its consequences e.g. teenage pregnancy, and increasing incidence of Reproductive Tract Infections /Sexually Transmitted Diseases/, and HIV/AIDS.

   -Drugs addiction: Increase in smoking, drug addiction and alcoholism, which are unfortunately, on the increase, both between adolescents and adults, in all parts of the state.

Recommendations

The major strategies for improving health of people, which can be adopted, are

1. Provision of graded referral system by the state, that is, within the reach of communities through primary, secondary, and tertiary institutions.
2. Educating the communities for adopting responsible health care practices.
3. Developing partnership with non-government organization and private-practitoners.
4. Functional integration of Indian system of medicine with health services.
5. Inter-sectoral co-ordination for health with other departments.
6. Greater utilization of information technology.

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References

1. District Statistical Hand Book, 2007; Kangra_ Himachal Pradesh.
2. Office records of Department of Health and Family Welfare, Kangra and Shimla, 2006; Himachal Pradesh-India.
3. Health at Glance, 2005 for Himachal Pradesh, India.
4. Bureau of Applied Economics and Statistics, Economic Survey 2004-05; Government of Himachal Pradesh, 2005.
5. Census of India, SRS Bulletin, Sample Registration System, Registrar General, New Delhi, India, 2007.
6. UNDP; Millennium Development Goals, India Country Report 2006, government of India, Ministry of Statistics and Program Implementation, New Delhi.
7. National Family Health Survey Reports, 1, 2 and 3 of Himachal Pradesh and India.

8. Increased Extra-Pulmonary Tuberculosis diagnosed and Treated under RNTCP in district Kangra from 2000 to 2004; 18th Union conference, Africa Region_3-5 March 2011/ Abuja, Nigeria.
9. Himachal Health Vision, 2020, Himachal Pradesh, India.

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Public Health as a Career Option: Postgraduate Students' Perspective

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Abstract

Background: Many students enter in Public Health discipline by default and not by genuine interest in the subject.

Objective: To explore the views of post graduates students of public health regarding their career choice.

Material and Methods: Two focus group discussions were done in Post Graduate Institute of Medical Educational Research (PGIMER), School of Public Health, Chandigarh among MD (Community medicine) and Master in Public Health (MPH) students. A questionnaire route was used for the Focus Group Discussion (FGD). Textual analysis was done.

Results: Public health was not the 1st choice of any of the respondents. Many respondents pursuing MPH course quoted that *"…Admission in MPH course is easier in comparison to MD…"* Families of the respondents didn't approve the career choice of their children. For many participants, Preventive and Social Medicine (PSM) meant WHO job, international assignments and good money ahead. Few respondents expect good opportunities for employment and promotions in government sector after completing MPH.

Conclusion: Both positive and negative attitudes toward the public health discipline were witnessed among the participants of the study. However more of negative shades were seen. The image of Public health in family and in medical fraternity needs to be built.

Key words: Public Health; Career options; Post graduate medical education; Community medicine.

Introduction

It has been a common observation that medical graduates are often not enthusiastic to choose public health discipline as a career. Public Health had not been attracting the best candidates from the health professions.[1] In any PG entrance examination for medical colleges all over India, the toppers usually prefer the clinical subjects. Usually, the students who join the public health courses have lower ranks in the test. It has been reported that, even after joining Community Medicine department, students remain confused about the value of this discipline. Many take the PG exam again to get the clinical subjects of their choice. Thus, many students enter in this discipline by default and

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not by genuine interest in the subject. So keeping this background in mind, we conducted a study in 2007-2008 with an objective to explore the views of post graduates students of public health regarding their career choice.

Material and Methods

We conducted two focus group discussions, in PGIMER School of Public Health, Chandigarh. First FGD was done on Nov 16, 2007. There were total eight participants, out of them, four were from MD (Community medicine) resident doctors and the other four were MPH students of 2007 batch. Another FGD was conducted in the same venue on September 15, 2008. There were nine MPH students of 2008 batch. The participants selected in the study were in same age group and all had joined the department few months back. A questionnaire route was used for the FGD. Prior concent for the FGDs was taken. It focused on the reason to join this field, their expectations, their families' expectations, aspirations, past experience of the subject, its image in the medical fraternity etc. A moderator and a co-moderator conducted the FGDs. Notes were taken and the proceedings were tape recorded. Textual analysis of the data was done. Prior consent for the FGDs was taken.

Results

Both positive and negative attitudes toward the public health specialty were witnessed among the participants of the study. However, more of negative shades were seen. During the two FGDs, following responses were obtained.

Public health was not the 1st choice of any of the respondents, as one of the respondent said *"…I had no idea about the subject….. I was interested in clinical subjects only…"*

Many respondents were pursuing MPH course as they had no option available as told by a respondent *"…Had I got a good rank in the PGI entrance, I would have not joined MPH…"*

For some of them, admission in the PG courses in public health was an easy option. Another respondent admitted *"…Admission in MPH course is easier in comparison to MD…"* One of the participants reported *"… I was desperate to do PG in any subject. It was my fourth attempt ….."*

Practical value and importance of PSM was realized by doctors when they finished the studies and started providing the medical care to the people, as quoted by one of the respondent, *"….Importance of PSM became clear to me only during internship period. But the real interest developed while doing the job in primary health center (PHC)….."*

Doing PG in public health was reported to lead to a decline in the market value of the male students as a bridegroom, as revealed through the quote of one of the respondent, *" I have lost 3-4 marriage proposals after joining public health course.."* MPH scholars seemed to be somewhat more confused about their future. *"..MD (community medicine) can get the job in the teaching institutes like PGI but what about the MPH people....?"*Another MPH student said that*"… I have to do DNB /PhD after completing the MPH to get a teaching job…"*

However, during the FGDs, positive views of some of the respondents were also witnessed regarding public health as a career option. For many participants, PSM meant WHO job, international assignments, great career, good money, name and fame ahead. One of the respondent said *"…it has tremendous scope….one can join the WHO…., one can even start his own NGO …."* Another respondent was happy about the non-commercial orientation of the discipline, he said *"… this is only specialty which talks about the health of common people, other specialties are driven by the pharma giants……"* One of the respondents aimed quite high he quoted as*"….only sky is the limit in public health, you can explore from 0 to 100…. .."*

Another respondent perceived great career opportunities in govt. sector for public health specialist, he quoted *"…under National Rural*

Health Mission (NRHM), one post of public health specialist to be created in each First referral Unit (FRU) across the country….." Another respondent from state health service, kept his eyes on higher posts in state health services. He told *"….. After completing the MPH degree, I might be posted as Medical Officer Health (MOH) in my state after few years of service. Great chances for promotion thereafter…"*

Few respondents considered that by doing public health course, they will be equipped with all the management skills which are essential while doing the job in government sector, as quoted by one of the respondent, *"…In my PHC, NRHM was functional for past 2 years, but I had neither power nor knowledge to utilize its provisions…I did not know how to manage it…."*

Few respondents reported that lack of public health professionals in the health system has led to the misutilisation of the resources, *"…. Medicines are supplied to the PHCs without rationalizing the need. These get expired unused…."* One of the participants considered that medical officer has to be expert in the administrative work also, as quoted by her, *"…You have to specialize in administrative work as critical works which are totally different things…"* Few participants considered that non availability of adequate doctors in our country needs to be compensated by hiring more of public health managers, *"… In USSR and UK, health services are well organized and are free of cost, the population is very less there. Moreover, the doctor patient ratio is very good, so they hardly need posts like public health managers….."*

Most of the participants agreed that, appointment of the public health manager in state health services is a must, *"…We can't increase our resources, but we can properly utilize them by appointing qualified programme managers…."*

Discussion

Attracting young, talented, and well trained individuals to do post graduation in community medicine is not easy. Primarily, this discipline does not seem attractive to them in comparison to the more glamorous specialties such as internal medicine, surgery or pediatrics. Even in terms of intellectual satisfaction, career, financial rewards, and prestige, public health ranks quite low. Moreover, because of gross commercialization of medical profession, the focus of doctors is mainly on curative or diagnostics technologies. For them, illness is a lucrative business. As a result, clinical subjects remain the 1st choice of the students and certainly not the subject of PSM.[2] Also, the excitement and the role models for medical students are found elsewhere then in community medicine. Experts had earlier opined that this will continue to be a problem for public health fraternity until inspired leadership can be found, exciting teaching and research programs established, and greater institutional support obtained. Community medicine can compete on an even basis with traditional departments when it can offer the same type of attractions. It must not only seem to be an equal, it must be equal. But so far this has not happened.[3]

In Indian set up family plays a major role in deciding about the career choice of the children. By and large Indian students go into medicine because of their parents' choice. The decision is almost never made by the student's themselves.[4] In fact, in Indian set up, parents have a lot of expectations from their children. Before the information technology (IT) boom, medical and engineering professions were the two most commonly sought careers. And for those who choose medical profession, the parents have a particular or specific image of a doctor. They expect their children to be treating patients in clinic. Public health was not considered as a good career option by the families of our respondents. One of the respondents found it difficult to answer this question from his parents and relatives. *"… beta! In which Outpatient department (OPD) do you sit in PGI..?"* Another respondent quoted *"…my parents were so angry with my choice of discipline that they never visited me at PGI….."* One of other respondent surprised his friends by joining the public health. He was greeted with *"…. Paagal ho gaye ho kya! (have you gone mad) Your rank was good enough for anesthesia, why did you opt for*

PSM…?" Another respondent was harassed by her peers as, *"….When I got admission in MPH, I was scolded by everyone…."* Parents do not understand the meaning of Public health. The image of Public health in family and in medical fraternity is low. Our study also reflected such impressions. Some parents were angry with the career choice of their children while others were disappointed.

A study conducted by Harsh et al on undergraduates in Indira Gandhi Medical College (IGMC) Shimla reported that >75% of the students entered in the medical profession only because of their parents' will.[5] This is in contrast to the results in study obtained by Lal et al who reported that 27% of the students in Maulana Azad Medical College (MAMC) New Delhi chose medical profession as per the wishes of their parents.

There is tradition of dowry system in many communities in India. Often, it operates like a market where grooms are hunted. Brides' parents do consider the image and earning potential of bridegroom, as evident from the matrimonial advertisements.[7]

Apparently the market value of a doctor with post-graduation in community medicine is low, as indicated by our results.

It should also be noted that most of the international organizations like WHO/ UNICEF/CARE etc. prefer to employ community medicine specialists but our own central and state health services have not created sufficient attractive job opportunities for them. Governemnt should also come forward with clearly defined policy regarding the career development for the public health specialists. In fact, the response of the various state governments in this regard has been inadequate. Many state governments send their medical officers to do MD (PSM), diploma in public health (DPH), Diploma Maternal and Child Health DMCW, MPH and Master of Applied Epidemiology (MAE) etc. But, there is a lack of any definite plan to offer them suitable placements after completing the degree. Many have been again appointed as general duty medical officers in the PHCs and other peripheral health institutions. Rather, many posts which require public health specialist skills have been filled from the pool of senior general duty doctors and bureaucrats. This creates discouragement, frustration and resentment among the doctors who choose to do post graduation in public health discipline.

Public health professionals have very little opportunity to do private practice or function independently. A study on "Training needs assessment for the district health managers" conducted in Orissa and Karnataka by IPH Bangalore supports our views on the issue. The study revealed that the majority of the clinicians were promoted as district level programme officers, without any kind of management training or degree. They have very little understanding of public health. Treating an individual patient is very different from managing the health of an entire district. Even so, most of them had an unfavorable attitude about their being given administrative responsibility.[8]

The low image our discipline in the society can be explained by the fact that the achievements of *public health and preventive medicine* are more difficult to be recognized by people. For general public, the doctor who cures a patient is the real doctor. The patient or his family, and even the community members, are all grateful to him. On the other hand, the silent victories of public health remain unappreciated. This accounts for the lack of attention paid to public health by people. Moreover, public health, unlike clinical practice, is at best a zero-gratitude job.[9]

In fact, the education and training of medical students in community medicine has been reported to be a chronicle of unbelievable misadventure. Students have never been taught to deal with the health needs of population groups but continue to learn to care for individual patients at the expense of the larger needs of the community and this despite the fact that community medicine is by definition a system of care based on population groups. There is an *Alice–in-Wonderland quality* here. Even worse, students often are not taught to care for anyone but are given no more than an

exposure to poor people during the brief outings.[3]

System of providing the exposure of field station or rural posting to the undergraduates is not an adequate and functional system, because this type of posting makes the community medicine synonymous with primary health care.[3] Surely community medicine is much more than the primary care. Whatever the skills and public health knowledge being acquired by the MBBS students remain underutilized by the system. The system expects preference of medical care over public health practice.

Learning environment plays an important role in education. The present education is confined to classroom or demonstrations or laboratory works whereas the actual problem they face in public health are in the community. Classroom practicals rarely reflect the true situation. Primary health care or public health cannot be taught in vaccum.It has to be hands on experience in the community or in any part of the health care systems.[1] One of the respondents reported her different experiences of PHC visits during MBBS and as a medical officer afterwards, she said "*….when we were students, it seemed to be easy as we visited ideal sort of PHC, But after joining there as a medical officer, I experienced totally different situation…*" Hence, more stress needs to be given on the skills testing in the real life field setup than mere a 'model classroom teachings'.

We should realize that even a single case of rare surgery is flashed through mass media immediately and people appreciate their endeavors. But the work done by public health professionals hardly gets any footage in media. People should be made to realize that while the clinicians treat the individual patient, the public health personnel operate on the mass level. Public needs to be told that public health professionals are doing a lot many activities. As, a District Health officer/District program managers they act as the nodal officers for the all the national programmes. In fact, rather being strictly confined to a limited role in disease prevention, public health has became a central feature of health sector through its involvement in policy making, management and evaluation at every level of health services. This explains the inevitable and continuous extension of the boundaries of public health.[10]

Glamour is still there in the discipline of public health. Rather, it is increasing as, MPH courses have been initiated in many universities in recent past. But, we lack in media management. We need to be media savvy. The fact can't be denied that the demand of trained public health professionals has been increased for past few years. The ambitious NRHM is desperately trying to post a public health personnel up to block level all over the country. In an international arena, the jobs for public health professionals have also become highly lucrative. On any day, one can verify that most of vacancy advertised in WHO website (http://www.who.int/employment/vacancies/en/) requires degree in public health/allied subjects as an essential educational qualification.

Numerous public health professional are already working in various national and international organizations like WHO, UNICEF, CARE, UNFPA, NIHFW, NICD, MOHFW and ICMR etc. International placements are offering tax free handsome salary, huge perks, flexi work hours, opportunities for worldwide travelling, avenues for career growth. The organization such as Public Health Foundation of India (PHI) is setting up the chain of Indian Institutes of public Health in India and offering a huge salary to the faculty. It also sponsors younger public health professionals to Public health institutes of excellence worldwide to develop them as future faculty members. (http://www.phfi.org/careers/ffproramme.html) Hence such an enviable scope of public health discipline should be accorded wide coverage in media.

Practicing the Public health can certainly be a satisfying career, as the community medicine specialists are popularly called as "*Five Star Doctor*". This implies that Community medicine specialist is an epidemiologist, a health manager, a health advocate, a health communicator, as well as a family physician.[11]

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References

1. BS Gar; Accreditation of Public Health Courses in India-The Challenges Ahead. *Ind J Comm Med.* 2004; 29: 52-55.
2. Durgawale PM, Durgawale PP. Medical Education: Our Current Concern. *Ind J Comm Med.* 2006; 31: 123-124.
3. Lathem W; The Future of Academic Community Medicine in developing countries. New York: The Rockefeller Foundation; 1979, 30-40.
4. Allen LR. Community Medicine at the All India Institute of Medical Sciences. Lathem W. Community Medicine Teaching, Research, and Health Care. London: Butterworths; 1970, 86.
5. Harsh et al. Factors affecting preference of medical undergraduates in IGMC Shimla. Sushruta. Shimla: IGMC; 2005, 32.
6. Lal P, Malhotra C, Nath A, Malhotra Rahul, Ingle GK. Career aspirations and apprehensions regarding medical education among the first year medical students in Delhi. *Ind J Comm Med.* 2007; 32: 217-218.
7. Times Classified. Chandigarh. The Times of India 8.9.2009;3-5
8. Elias MA, Devadasan N. Poor management skills contributes towards public health failure; 2 http://www.iphindia.org/new/images/Publications/failure.pdf Last accessed on 8.7.2012
9. Pencheon D, Guest C, Melzer D, Gray MJA (Editors). Oxford Textbook of Public Health Practice. 2nd edition. New York: Oxford University Press; 2007.
10. Singh AJ. Editorial, What is (there) in a name? *Ind J Comm Med.* 2004; 29: 151-154.
11. Boelen C. The five-star doctor: An asset to health care reform? Geneva. World Health Organization 1993 http://www.who.int/hrh/en/HRDJ_1_1_02.pdf Last accessed on 08.05-2012

Original Article

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Prevalence of Self-Reported Diabetes in a Rural Area of Mysore, India: Need for Community Based Screening Action

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Abstract

Background: Diabetes epidemiological prevalence study is a preliminary step for planning community based intervention on diabetes care and prevention. Sporadic epidemiological studies on diabetes in India have been conducted but Community-based prevalence (self reported) estimates are unavailable for rural Mysore.

Aims: Aim of this study was to estimate the prevalence of self-reported diabetes mellitus in rural Mysore.

Setting and Design: This study was conducted in the field practice area of two Rural Health Centres (PHCs), JSS Medical College, Mysore with retrospective data from Comprehensive Data base of the family records.

Methods: An individual should have been diagnosed to be a diabetic by a medical doctor and who was on anti diabetes treatment for at least the past six months.

Results: We found 423 persons to be diagnosed with diabetes. Prevalence of known diabetes in the general population was 1.8% (423/23,281). Prevalence of known diabetes among persons aged above 35 years was 4.3%. Sex-specific prevalence of diabetes in rural Mysore was 2.1% (248/11,984) and 1.5% (175/11299) for men and women respectively.

Conclusions: Community-based health surveillance data comprise a useful tool to measure the prevalence of diagnosed cases of diabetes mellitus within the Indian context. Low prevalence of known diabetics reflects ice berg phenomena in the burden of diabetes. High proportions of undiagnosed diabetic cases in the population are to be detected through screening programs.

Key words: Community-based study; Diabetes prevalence; Self-reported-diabetes; Rural; Mysore.

Introduction

The health care needs of the Indian population are undergoing dramatic changes due to ongoing demographic transition. Non communicable diseases like Cardio-Vascular Diseases, Cancer, Diabetes and Hypertension are rapidly replacing infectious diseases and are

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becoming the leading causes of morbidity, mortality and disability.[1]

Disease and risk factor surveillance involves a systematic analysis and interpretation of data; changes in population, health behaviour are also to be monitored. Such data are useful to inform public and decision makers for planning and evaluating prevention and control programs and designing health policy and legislation.[2]

Over the past three decades, diabetes has become a major cause for morbidity and mortality. The largest increase of the diabetic population occurs in the most economically productive age group.[3]

Population-based studies showing the prevalence of type 2 diabetes in different parts of India have recently been reviewed[4,5] and shows that the prevalence has risen five-fold from 2.1 percent in 1975 to 12.1 percent in 2000.[6-13] and there exists higher prevalence in urban area than rural areas. However, there have been no community-based prevalence rates for diabetes available from rural Mysore in the recent past except for Suttur survey[14] that indicated that there is an increasing problem of diabetes in the region.

Region-specific prevalence data of diabetes are needed, so that appropriate public health measures can be initiated by public policymakers and supported by all those concerned. Very few data are available for rural area where more than 70 percent of the population lives and in the absence of surveillance system for Non communicable diseases.

Thus, in estimating the prevalence of diabetes in a defined geographical area, the logical first step would be to know the number of diagnosed diabetes patients and then apply, cost-effective screening methods among the high-risk group to identify the undiagnosed diabetes patients.

As an initial step towards diabetic care in our service area, we undertook this study with the following objectives

i) to estimate the prevalence of known diabetes in the service area of the Rural Health Centre (PHC's), JSS Medical College, and
ii) then use this data to study associated factors with diabetes in the rural area of Mysore district.

Subjects and Methods

This is a community based cross–sectional (descriptive) study carried out in the service area of the rural primary health centre (PHC Suttur and PHC Hadinaru of Nanjangud taluk. Mysore district) of Department of Community Medicine, JSS Medical College. The two PHC's are around 20 kilometres away from Mysore city. The two PHC's cover a population of 14,000 and 24,000 respectively. Source of data for the study was obtained from the comprehensive data base. Comprehensive data base was prepared by conducting a cross-sectional study in the field Practice area of JSS Medical College.

The study protocol was approved by the JSS Medical College Institutional Ethics Committee. Informed consent was obtained from the individuals before data collection. They were encouraged to continue regular treatment and follow-up for their illness.

Data collection was carried out from January 2008 to December 2008. The field investigators were interns posted to department of Community Medicine. The interns were trained to collect information from each household and they obtained the information on a pretested proforma.

Part I of the proforma obtained household information. Part II was prepared to obtain the socio-demographic information of the individuals like age, gender, education, marital status, type of family, occupation, the type of house and the land holding was used to assess the socio-economic status of the individual, their dietary pattern, and also the tobacco and alcohol consumption was noted and the third part of the proforma obtained information regarding the chronic morbidities like diabetes, hypertension and asthma they were treated for.

Table 1: Prevalence rate (in %) of known diabetics according to age

Age (yrs)	No. of subjects	No. of diabetics	%
0-14	5106	0	0.0
15-34	8938	20	0.2
35-54	6208	181	2.9
55 & Above*	3029	222	7.3
Total	23,281	423	1.8

*p value < .05

In the present study a known diabetic was defined as an individual who was diagnosed to have diabetes by a health professional and was on anti diabetic treatment for the past six months and this was cross checked with medical records.

Statistical Analysis

Excel spreadsheets was used for data entry and cleaning. Epi-info software version 3.5.3 was used for analysis. Overall prevalence rate of self reported diabetes was calculated. Prevalence of self reported diabetes was calculated for the individual factors. Chi-square test was performed to test the association between the prevalence of diabetes and various factors. Multi-variate logistic regression analysis was carried out to identify the independent factors that were associated with diabetes.

Results

Table 1 shows the age-specific prevalence of self reported diabetes in the area. There were a total of 423 individuals with diabetes in the population of 23,281, the prevalence was found to be 1.8% in the general population. In the age group of e" 35 years, the prevalence was 4.3 percent whereas the age-specific prevalence was above 7.3 percent after the age of 55 years.

Table 2: Prevalence Rate (in %) of Known diabetes according to demographic and clinical characteristics

Factor	Categories	No. of study subjects	No. of diabetics	Prevalence rate (in %)	P-value
Gender	Men	9361	248	2.6	**>0.05**
	Women	8815	175	2.0	
Education	Illiterate	8966	306	3.4	**<0.05**
	Literate	613	17	2.8	
	Primary	1285	21	1.6	
	Middle	3486	47	1.3	
	High school	2390	17	0.7	
	Puc & above	1435	15	1.4	
Occupation	Farmer	3529	116	3.3	**<0.05**
	Laborer	4519	54	1.2	
	Office job	738	9	1.2	
	Shop keeper	241	5	2.1	
	Businessmen driver,	719	34	**4.7**	
	Housewife	5958	137	2.3	
	Retired	663	65	**9.8**	
	Unemployed	144	3	2.1	
Diet	Vegetarian	3716	140	3.8	**<0.05**
	Non-vegetarian	14459	283	2.0	
Current Tobacco Use	Yes	2098	104	**5.0**	**<0.05**
	No	16078	319	2.0	
Current Alcohol use	Yes	895	50	**5.6**	**<0.05**
	No	17281	373	2.2	
History of Hypertension	Yes	696	185	**26.6**	**<0.05**
	No	17480	238	1.4	
History of COPD/Asthma	Yes	268	21	**7.8**	**<0.05**
	No	17907	402	2.2	

Table 3: Multiple Logistic Regression Analysis for Association of Various Risk Factors with Prevalence of Diabetes

Variable	Categories	Odds Ratio	95% CI (lower limit-upper limit)	P-value
Age in years	15-34	1		
	35-54	9.218	5.617-14.833	**<0.01**
	>55	15.425	9.374-25.383	**<0.01**
Sex	Male	1		
	Female	0.732	0.361-1.184	>0.05
Education	Illiterate	1		
	< 10 years of schooling	0.822	0.626-1.081	>0.05
	>10 years of schooling	0.699	0.458-1.068	>0.05
Type of occupation	Farmer/labourer	1		
	Professional/ Businessmen	1.638	1.133-2.368	**<0.01**
	Housewives	1.903	1.334-2.714	**<0.01**
	Retired /unemployed	2.375	1.574-3.505	**<0.01**
Tobacco consumption	No	1		
	Yes	1.125	0.832-1.521	>0.05
Alcohol consumption	No	1		
	Yes	1.467	1.605-2.140	**<0.01**
Hypertension	No history	1		
	Positive History	11.399	9.082-1430	**<0.01**
COPD /Asthma	No history	1		
	Positive History	1.125	0.676-1.87	>0.05

Table 2 shows the prevalence of self-reported diabetes in the area according to various demographic and clinical characteristics. There were 248 males and 175 females with known diabetes. The prevalence rates were 2.6% among males and 2.0% among females; the difference was not statistically significant ($P > 0.05$).

It was observed that the Vegetarians had higher prevalence of diabetes than non-vegetarians (3.8% vs. 2.0%). The prevalence of diabetes was observed to be high among the tobacco users than the non users (5% vs 2%). Similarly the prevalence of diabetes was high among alcohol users than the non users. Prevalence of diabetes was very high among persons who gave a history of hypertension than those persons who did not give a history of hypertension (26.6% vs 1.2%). It was observed that the prevalence of diabetes was higher among the persons who gave history of Asthma/COPD than the persons who did not give the history of Asthma/COPD (7.8% vs 2.2%).

Table 3 shows the results of multiple logistic regression analysis which was performed to remove the effect of the confounding variables and identify the independent factor associated with diabetes. Persons aged above 35 years, professional workers, tobacco and alcohol consumers, hypertensive and asthmatics are high risk group for diabetes

Discussion

Diabetes burden in India has been increasing exponentially year after year in urban as well as rural areas.[3] In order to develop a comprehensive diabetes care, understanding the burden of the disease is of prime

importance. In the past 20 years, there has been an increase in diabetes related prevalence studies in India. In the present study the overall prevalence of diabetes in the general population was 1.8 percent and among persons aged above 35 years was 4.3 percent. The prevalence of diabetes mellitus in rural India is within a broad range of 0.8 percent to 9.3 percent.[9-18] A high prevalence of 14.6 percent was estimated in study carried out in rural central Kerala.[20]

Previous diabetes prevalence studies have clearly depicted the ratio of Known:Unknown diabetic was ranging from 1:1 to 1:3 in rural areas[15,17,22] and 1:3.3 in urban areas.[21] Estimated prevalence in the present study represents a tip of the ice-berg and a large portion of the diabetes patients still remain undiagnosed in the community. Poor socio-economic circumstances, lack of awareness regarding the disease and the absence of a well equipped health delivery system, absence of routine screening program for diabetes, the disease may not have been diagnosed. The prevalence in rural India may be much higher than previously realized. Hence, community based health awareness and screening programs for diabetes are the need of the hour.

As observed in the study, a high prevalence of diabetes is associated with alcohol and tobacco consumption. High prevalence has also been observed among individuals with other co-morbidities like hypertension and COPD. Diabetes related complications is observed to be high and would occur at a faster rate among patients who have co-existent morbidities. Diabetic complications would worsen the quality of life and increase the cost of diabetic care.

An increased odds of association of diabetes was observed among persons aged above 35 years, among professional workers, housewives, retired persons, tobacco and alcohol consumers, hypertensive and asthmatics. These groups of people are at high risk of having diabetes.

Conclusion

We conclude that persons aged above 35 years, tobacco users, alcohol consumers, hypertensive and asthmatics should be screened for diabetes in rural areas of Mysore.

References

1. Shah B, Mathur P. Surveillance of Cardiovascular disease risk factors in India: the need & scope. *Indian J Med Res*. 2010; 132: 634-42.
2. Deepa M, Pradeepa R, Anjana RM, Mohan V. Non communicable Diseases Risk Factor Surveillance: Experience and Challenge from India. *Indian J Community Med*. 2011; 36(1): 50-6.
3. Sicree R, Shaw J, Zimmet P. Diabetes and impaired glucose tolerance. In: Gan D, editor. Diabetes Atlas. International Diabetes Federation. 3rd ed. Belgium: International Diabetes Federation; 2006, 15-103.
4. Mohan V, Sandeep S, Deepa R, Shah B, Varghese C. Epidemiology of type 2 diabetes: Indian scenario. *Indian J Med Res.* 2007; 125: 217-30.
5. Mohan V, Madan Z, Jha R, Deepa R, Pradeepa R. Diabetes–social and economic perspectives in the new Millenium. *Int J Diabetes Dev Countries.* 2004; 2: 29-35.
6. Ahuja MM. Epidemiological studies on diabetes mellitus in India. In: Ahuja MM, editor. Epidemiology of diabetes in developing countries. New Delhi: Interprint; 1979, 29-38.
7. Ramachandran A, Jali MV, Mohan V, Snehalatha C, Viswanathan M. High prevalence of diabetes in an urban population in south India. *BMJ*. 1988; 297: 587-90.
8. Sridhar GR, Rao PV, Ahuja MM. Epidemiology of diabetes and its complications. In: RSSDI textbook of diabetes mellitus. Hyderabad: Research Society for the Study of Diabetes in India; 2002, 95-112.
9. Rao PV, Ushabala P, Seshaiah V, Ahuja MM, Mather HM. The Eluru survey: Prevalence of

known diabetes in a rural Indian population. *Diabetes Res Clin Pract.* 1989; 7: 29-31.

10. Ramachandran A, Snehalatha C, Dharmaraj D, Viswanathan M. Prevalence of glucose intolerance in Asian Indians: Urban-rural difference and significance of upper body adiposity. *Diabetes Care.* 1992; 15: 1348-55.
11. Ramachandran A, Snehalatha C, Latha E, Vijay V, Viswanathan M. Rising prevalence of NIDDM in an urban population in India. *Diabetologia.* 1997; 40: 232- 7.
12. Menon VU, Kumar KV, Gilchrist A, Sugathan TN, Sundaram KR, Nair V, *et al* . Prevalence of known and undetected diabetes and associated risk factors in central Kerala -ADEPS. *Diabetes Res Clin Pract.* 2006; 74: 289-94.
13. Raman Kutty V, Joseph A, Soman CR. High prevalence of type 2 diabetes in an urban settlement in Kerala, India. *Ethn Health.* 1999; 4: 231-9.
14. Basavangowdappa H, Prabhakar AK, Prasannaraj P, Gurudev KC, Virupaksha, Suma. Study of prevalence of Diabetes Mellitus and Impaired fasting glucose in a rural population. *Int J Diab Dev Countries*. 2005; 25: 98-102.
15. Clara K Chow, Krishna Raju P, Rama Raju, Reddy KS, Mangolia Cardona, David S Celermajir, Bruce C Neal. The Prevalence and Management of Diabetes in Rural India. *Diabetes care*. 2006; 29: 1717-1718.
16. Kokiwar PR, Gupta S, Durge PM. Prevalence of diabetes in a rural area of central India. *Int J Diab Dev Ctries*. 2007; 27: 8-10.
17. Gupta SK, Singh Z, Purty AJ, Kar M, Vedapriya DR, Mahajan P, Cherian J. Diabetes prevalence and its risk factors in a rural area of Tamil Nadu. *Indian J community Med.* 2010; 35: 396-9.
18. Patadin S, Bots ML, Abel R, Valkenburg HA. Impaired glucose tolerance and diabetes mellitus in a rural population in South India. *Diabetes Res Clin Pract.* 1994; 24: 47-53.
19. Zargar AH, Khan AK, Soodi SR, Laway BA, Wani AI, Bashir MI, et al. Prevalence of type 2 diabetes mellitus and impaired glucose tolerance in Kashmir valley of Indian subcontinent. *Diabetes Res Clin Pract.* 2000; 47: 135-46.
20. Vijayakumar G, Arun R, Kutty VR. High Prevalence of type 2 diabetes mellitus and other metabolic disorders in rural central Kerala. *Journal of Associations of Physicians of India*. 2009; 57(8): 563-567.
21. Sadikot SM et al. The Indian task force on diabetes care in India. Available from http://www.diabetesindia.com/diabetes/itfdci.htm. Accessed on 14.8.2010.
22. Majgi SM, Soudarssanane BM, Roy G, Das AK. Risk Factors of Diabetes Mellitus in Rural Puducherry. *Online J Health Allied Scs.* 2012; 11(1):4. Available from**:** http://www.ojhas.org/issue41/2012-1-4.html.

Original Article

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Morbidity Profile of Under-five Children residing in Rural Area of North Karnataka

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Abstract

Context: Children under five years of age constitute approximately 15% of the country's total population and are the most vulnerable section of the society and suffer from highest morbidity. The major diseases affecting this age group are mostly acute diarrheal diseases, acute respiratory infections, anaemia, skin infections, ear discharge, eye infections etc.

Aims: To find the morbidity profile of under-five children in a rural area and also to find out the association between nutritional status and morbidity.

Settings and Design: Cross sectional study.

Methods and Material: This study was carried out from January – December 2011 in Primary health centre, Handignur, Belgaum among children between 1-5 years of age who were selected by using simple random sampling method. Totally 933 children were included in the study. Every child was subjected to thorough clinical examination and anthropometric measurements in the anganwadi.

Statistical analysis used: Chi-square test was used for testing association between morbidity and nutritional status.

Results: In the present study, 933 children in the age group of 1-5 years were studied for the assessment of morbidity pattern. Among these, 48.55% were males and 51.45% were females. Nutritional status of children assessed by WHO classification showed that 21.9% were wasted, 32.3% were underweight and 34.1% were stunted. Acute respiratory infections were the most commonly reported morbidity (15.9%) in the past 15 days, followed by fever (4.9%). Acute Gastroenteritis was reported in 3.5% of children and eye, ENT and skin together contributed 3.6%.

Conclusions: Acute respiratory infections and diarrheal diseases were common among under five children though Govt. of India has made sincere efforts to improve the overall health of under-five children using a multi- pronged approach under NRHM.

Keywords: Morbidity profile; Under-five children; Rural area

Introduction

Children under five years of age constitute approximately 15% of the country's total population and are the most vulnerable section of the society and suffer from highest morbidity. First few years of life is the most crucial period

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of life as this age is known for accelerated growth and development, warranting regular monitoring. During this period about 40% of physical growth and 80% of mental development occurs. Any adverse influences during this period may result in severe limitations in their development. This age group is most affected by various common and easily treatable illnesses.

Three in four episodes of childhood illness are caused by one of these conditions-acute respiratory infections (mostly pneumonia), diarrhea, measles, malaria, malnutrition or a combination of these conditions. Among these malnutrition is the most common underlying cause for all other morbidities. Malnutrition is a silent emergency. Malnutrition is frequently part of a vicious cycle that includes poverty and disease. These three factors are interlinked in such a way that each contributes to the presence and permanence of the others. Socioeconomic and political changes that improve health and nutrition can break the cycle; as can specific nutrition and health interventions. The health and social consequences of the current high prevalence of impaired child growth in developing countries are severe. The major outcomes of malnutrition during childhood may be classified in terms of morbidity, mortality, and psychological and intellectual development; there are also important consequences in adult life in terms of body size, work and reproductive performances, and risk of chronic diseases.[1]

The other major diseases affecting this age group are mostly anaemia, skin infections, ear discharge, eye infections, traumatic injuries etc. The attributes that can be associated with these diseases are mostly overcrowding, poor sanitation, lack of basic amenities, lack of awareness about proper child care among parents of these children.

A number of child survival strategies implemented by GOI has resulted in impressive improvement in morbidity and mortality indicators but the results have not been consistent. The pace of improvement is expected to accelerate further upon full implementation of activities under NRHM (National Rural Health Mission)[2]. The assessment of health status of under five or pre-school children reflects the health condition of a nation. It also helps in obtaining base line data for planning, interventions, follow up and evaluation of health services, provided to these children. Keeping in view the above facts, this cross sectional study was carried out with following objectives:

1. To find the morbidity profile of under five children in rural area
2. To find out the association between nutritional status and morbidity.

Materials and Methods

Study area

The present community based cross-sectional study was conducted in children between 1-5 years of age from Primary health centre, Handignur, Belgaum which is a rural field practice area of Department of Community Medicine, Jawaharlal Nehru Medical college, Belgaum. Duration of the study was from January 2011 to December 2011. The total population of the area was 33,600.

Study subjects

Study subjects consisted of children aged between 1-5 years residing in four sub-centres of Handignur Primary health centre. Total 2097 children aged between 1-5 years were registered in anganwadi. Sampling frame was prepared and 933 children were selected and included in the study.

Sample size

The optimal sample size of 933 study subjects was calculated on the basis of 30% prevalence of under-nutrition which was one of the most common morbidity noted in under-five children.

$n = 4pq/d^2$

where p = prevalence, q = 100-p, d = allowable error 10% of 'p'

Methodology

Totally 2097 children aged between 1-5 years were registered in anganwadi. Sampling frame was prepared and by using simple random sampling 933 children were selected and included in the study. A attempt was made to cover maximum number of selected children by giving 3 visits to their house. The information obtained from child's mother was filled in the proforma. Every child was subjected to thorough clinical examination in daylight, and anthropometric measurements in the anganwadi.

Anthropometry

Anthropometric measurements[3] taken were weight, height, mid-arm circumference by following techniques.

Weight

Weight of children aged less than 2 years was measured using children weighing machine while for children more than 2 years, adult weighing machine was used. The machine was regularly checked. Method employed for weighing was near accuracy of 100 grams.

Height & Length

Height was measured by making child, after removing the shoes, to stand on a flat surface with feet parallel and with heels, buttocks, shoulders and back of head touching upright the wall. The head were held comfortably erect, with the lower border of the orbit in the same horizontal plane as the external auditory meatus. The arms were made to hang at sides in natural manner. Measurement was done with the help of fibre glass measuring tape. For infants and children below five years of age, who could not stand, length was measured by making child laid on flat surface, head positioned firmly against the fixed hardboard, with the eyes looking vertically. The knees extended, by applying firm pressure and feet are flexed at right angles to the lower legs on the board. Length was measured between the two boards to the nearest accuracy 0.1 cm.

The nutrition status was classified based on WHO classification.[4]

Morbidity Assessment

Morbidity was also assessed along with anthropometric measurements, for recent illness in last 15 days prior to the visit using a proforma describing symptoms of common childhood illnesses. The illnesses were grouped according to the system. Thus, vomiting, diarrhea, dysentery, stomach-ache, etc. were considered as gastrointestinal (GI) ailment. Similarly, cold, cough, otitis media, breathlessness, etc. were considered as respiratory (RTI) ailment. Fever, Eye, ENT, skin was considered separately and other conditions such as congenital anomalies were categorized as others. Proportion of ill children in each age group offered the estimates of prevalences.

Clinical Assessment

A detailed proforma was prepared for clinical assessment of individual child at the time of anthropometric measurements. This included examination of head, eyes, oral cavity, skin, edema, signs for vitamin deficiency, anemia and systemic examination. Anemia was assessed clinically by examination of eyes and nails.

Informed consent was obtained from institutional ethical committee.

Consent of all the mothers of those children included in the study was taken.

Statistical Analysis

Data was analyzed on Epi-Info Software 3.2 version. Chi square test is used to test the significance.

Results

In the present study, 933 children in the age group of 1-5 years were studied for the

Table 1: Distribution of children according to Age and Sex

S.No	Age(in months)	Males		Females		Total	
		No.	%	No.	%	No.	%
1.	12-23	105	50.00	105	50.00	210	22.5
2.	24-35	115	45.24	122	45.24	237	25.4
3.	36-47	111	51.15	106	48.85	217	23.3
4.	48-60	122	45.35	147	54.65	269	28.8
Total		**453**	**48.55**	**480**	**51.45**	**933**	**100**

assessment of morbidity pattern. Among these, 48.55% were males and 51.45% were females. With regards to age distribution it was observed that in 12-23 months age group, male and female children were represented equally with 50% each. (Fig 1) In 36-47 month age group males were more than females whereas in 24-35 and 48-60 age groups females were more than males.

All children belonged to Hindu religion.

In context to the literacy status of parents, 13% of fathers and 14.3% were illiterates. Among the literate fathers, it was observed that 26.3% had primary education, 41.2% had completed high school/secondary education, 17.3% had post SSLC education and 2.4% had completed their graduation. Among mother, 34% had primary education, 45.7% had secondary education, 5.3% had undergone post SSLC/ Diploma education and only 0.9% had completed graduation.

Majority of father's were farmers by occupation (45.1%) and mothers were housewives (55.9%). With regards to socio-economic status, majority of children belonged to Class IV (32.2%) and Class V (30%). (Fig 2)

Nutritional status of children assessed by WHO classification showed that 21.9% were wasted, 32.3% were underweight and 34.1% were stunted (Fig 2).

Acute respiratory infections was the most commonly reported morbidity (15.9%) followed by fever (4.9%). Acute Gastroenteritis was reported in 3.5% of children and eye, ENT and skin together contributed 3.6% (Fig 3).

Morbidities noted on clinical assessment were anaemia (10.9%), caries teeth (10.3%), URTI (8.6%) and pyoderma (6%). (Fig 4). Skin infections and injuries were commonly seen in children between 1-3 years whereas anaemia and caries teeth were common morbidities in children aged 4 -5 years.

When mothers were enquired about child's past illness requiring hospitalization, it was found that 83.2% did not suffer from any major illness. Among the rest (16.8%) who underwent hospitalization, the most common morbidity noticed was acute GE (4%), ARI (3.8%), fever (3.3%) and febrile convulsions (2%).

However, it was noted that past illness and history of hospitalization was not significantly associated with the nutritional status of the child ($p > 0.05$). But present morbidity over the past 15 days was significantly associated with wasting and underweight (with $p = 0.001$ and 0.002 respectively). Stunting was more in children who had a birth weight of less than 2.5 kg ($p < 0.05$).

Table 2: Distribution of children according to nutritional status

Grades of malnutrition	Weight for Height Wasting		Weight for age Underweight		Height for age Stunting	
	No.	%	No.	%	No.	%
Severe	69	7.3	77	8.2	119	12.7
Moderate	137	14.6	225	24.1	200	21.4
Normal	727	77.9	631	67.6	614	65.8
	933	**100**	**933**	**100**	**933**	**100**

Table 3: Age –wise distribution of children according to the presence of morbidity

Morbidity in last 15 days	Age in months				Number	Percentage
	12-24	25-36	37–48	49-60		
Fever	14	16	6	10	46	4.9%
Respiratory Cold/URTI/ LRTI	34	42	32	40	148	15.9%
Gastrointestinal Acute GE	13	9	5	6	33	3.5%
Eye	0	0	1	0	7	0.8%
ENT	0	5	1	1	7	0.8%
Skin	6	3	5	5	19	2.0%
Others (trauma, burns)	2	5	4	5	10	1.1%
No morbidity	141	157	163	202	663	71.1%
Total					933	100
$X^2 = 29.367$, df= 21, p = 0.105						

Discussion

In the following study, the most common morbidity noted among under-five children was under- nutrition. Apart from under-nutrition, 28.9% of children suffered from other morbidities. Common among the other morbidities were respiratory illness (15.9%), fever (4.9%), acute GE (3.5%). Similar findings have been reported in NFHS-3[5] and studies by Sachithananthan V, Chandrashekhar U.[6] In a study conducted in Etawah district of Bhopal[2], it was noted that children suffered from multiple episodes of diarrhea followed by Upper respiratory tract infections. Jammu study [7] showed a much higher prevalence of acute respiratory infections (47.26%), diarrhoeal diseases (30.10%). The analysis by sex showed that females suffered more number of episodes of illness i.e., 5.6 episodes/ child/year whereas in males it was only 4.0 episodes per child per year in Jammu study.[7] But in our study no such difference in sex was noted. Jain S et al (2000)[8] reported a high prevalence of anaemia in children of age 1-2 years in urban slums of Meerut in contrast to our study where the prevalence was high in 4-5 year age group. Also prevalence of anaemia was found to be

Table 4: Age-wise distribution of morbidity in children based on clinical assessment

Morbidity	Age in months				Number	Percentage
	12-24	25-36	37–48	49-60		
Fever	4	2	4	1	11	1.17%
Cold/ URTI	20	21	14	25	80	8.57%
Caries	7	12	20	57	96	10.28 %
Anaemia	22	45	52	74	193	20.68 %
Ear	1	3	7	3	14	1.5%
Eye	0	0	0	4	4	0.43%
Skin	15	14	16	11	56	6.0%
Injuries	1	6	4	4	15	1.6%
Others (Burns, deformities, congenital anomalies, operation scar)	3	3	4	4	14	1.5%
No morbidity	137	131	96	86	450	48.23 %
Total					933	100
$X^2 = 123.14$, df= 27, p=0.000						

Table 5: Association between nutritional status and morbidity in children

Past illness requiring hospitalisation						
Hospitalisation	Wasting		Underweight		Stunting	
	No.	%	No.	%	No.	%
Yes	36	17.47	57	18.87	46	14.42
No	170	82.5	245	81.12	273	85.5
	X^2= 0.079, df=1, p=0.778		X^2= 1.337, df=1, p=0.248		X^2= 2.007, df=1, p=0.157	
Present illness over past 15 days						
Illness	No.	%	No.	%	No.	%
Yes	79	38.3	107	35.43	101	31.66
No	127	61.6	195	64.56	218	68.33
	X^2= 11.385, df=1, p=0.001*		X^2= 9.150, df=1, p=0.002*		X^2= 1.747, df=1, p=0.186	
Morbidity based on clinical assessment						
Morbidity	No.	%	No.	%	No.	%
Present	97	47.08	147	48.6	158	49.5
Absent	109	52.9	155	51.32	161	50.47
	X^2= 0.973, df=1, p=0.324		X^2= 2.320, df=1, p=0.128		X^2= 1.711, df=1, p=0.191	

significantly higher in children having low nutritional status as compared to normal nutritional status but this was not statistically significant.

Prevalence of gastrointestinal, respiratory illness and fever was higher in younger children than older children in a Pune study[9] which was similar to the results of our study. Major morbidity was nutritional may be due to low purchasing power of the families as most of the families belonged to socioeconomic class IV and class V. In the present study, the overall prevalence of underweight, stunting and wasting was 32.36 %, 34.19 % and 22.07%, respectively. The prevalence of underweight in the present study (32.36%) was less than the national prevalence as assessed during NFHS-3 survey (43%).[5] A study done in West Bengal reported a similar prevalence of underweight and wasting of 33.9%, & 19.4%, but a lesser prevalence of stunting (26.1%).[10] Wardha study reported a much higher prevalence of underweight (47.4%).[11] Tanzania study[12] reported a underweight prevalence of 31.2% but a low prevalence of wasting (17.2%) and stunting (17.2%). In our study, 8.3 %, 12.8 % and 7.4 % of children were found to be severely underweight, stunted and wasted, respectively. Our results were much higher compared to Tanzania study[12] where the proportion of severe underweight was 6% and severe wasting and stunting 3.2%. In contrast, Wardha study[11] reported a much higher percentage of underweight (16.9%).

Past history of illness played an important role in the nutritional status of children in a Nagpur study[1], but in our study past history of illness had no significance ($p > 0.05$ Table 5)

Conclusion

Total number of under-five children, assessed were 933. Number of female children was more than male children. Maximum number of children belonged to 4-5 years age group. The most common morbidity noticed was malnutrition.

Respiratory tract infection topped the list of health problems in under-fives followed by diarrhoea, fever, skin diseases, eye diseases and ear problems. The present study concludes that acute respiratory infections and diarrheal

diseases are still common among under five children through Govt. of India has made sincere efforts to improve the overall health of under-five children using a multi- pronged approach under NRHM.

Recommendations

1. Under five children should receive highest priority.
2. Specific health promotional, preventive and curative services should be provided to reduce the under five morbidity and mortality.
3. For the prevention of these diseases, parent education should start as early as possible especially during antenatal period or early postnatal period.
4. Continuing medical education of health professional with emphasis on their role not only in management but also in the administration of preventive should be carried out periodically.

Limitations of the study

History of past morbidity was based on recall of the anganwadi teacher and the parents of under-five children. So there could be a possibility of recall bias. Since diagnosis of anaemia was based on clinical examination, observer bias is possible.

Acknowledgement

We thank the Head of Department of Community Medicine for having given the opportunity to carry out the present study.

References

1. Narkhede V, Sinha U, Bhardwaj S, Pitale S. Morbidity profile in under five children in urban slum area of Nagpur. *National Journal of Community Medicine.* 2012; 3(3): 442-46.
2. Srivastava DK, Tripathi D, Gour N, Jain PK, Singh CM, Srivastava AK et al. Morbidity profile of under-five children in urban slum of Etawah District. *Indian Journal of Community Health.* 2012; 24(2): 153-57.
3. World Health Organization. Physical Status: The Use and Interpretation of Anthropometry. Technical Report Series No.854. Geneva: WHO, 1995.
4. WHO child growth standards and the identification of severe acute malnutrition in infants and children WHO – UNICEF [Internet] c2011WHO [accessed on 2011 Oct 23] Available from: www.who.int/nutrition/.../severe malnutrition/9789241598163_eng.pdf
5. National Family Health Survey (NFHS-3) India 2005-06. Nutrition in India. Ministry of Health and Family Welfare. Government of India [Internet] [accessed on 2011 Jan 06] Available from: www.measuredhs.com/pubs/pdf/ FRIND3/FRIND3-Vol 1[Oct-17-2008].pdf
6. Sachithananthan V and Chandrashekhar U. Nutritional status and prevalence of Vitamin A deficiency among pre-school children in urban slums of Chennai city. *The Indian Journal of Nutrition and Dietetics.* 2005; 42: 259-265.
7. Gupta S, Jamwal DS, Kumar D, Gupta SK. Morbidity among Under five children in a Rural Area of Jammu. *JK Science.* 2012; 14(2): 85-88.
8. Jain S, Chopra H, Garg SK, Bhatnagar M and Singh JV. Anaemia in children: early iron supplementation. *Indian Journal of Pediatrics.* 2000; 67(1): 19-21.
9. Rao S, Joshi SB, Kelkar RS. Changes in nutritional status and morbidity over time among pre-school children from slums in Pune. *Indian Pediatrics.* 2000; 37: 1060- 1071.
10. Bisai S, Bose K, Ghosh A. Nutritional status of Lodha children in a village of Paschim Medinipur district, West Bengal. *Indian J Public Health.* 2008; 52: 203-206.
11. Deshmukh PR, Dongre AR, Gupta SS, Garg BS. Newly developed WHO Growth Standards: Implications for Demographic Surveys and Child Health programs. *Indian Journal of Pediatrics.* 2007; 74: 987-90.
12. Nyaruhudra CNM, Mamiro PS, Kerengi AJ, Shayo NB. Nutritional status of under- five children in a pastoral community in Simanjiro District, Tanzania. *Tanzania Health Research Bulletin.* 2006; 8(1): 32-36.

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[1] Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. J Oral Pathol Med 2006;35:540-7.

[2] Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. Acta Odontol Scand 2003;61:347-55.

Article in supplement or special issue

[3] Fleischer W, Reimer K. Povidone iodine antisepsis. State of the art. Dermatology 1997;195 Suppl 2:3-9.

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[4] American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. J Periodontol 2000;71:1792-801.

Unpublished article

[5] Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure. Dent Mater 2006.

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[6] Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

Chapter in book

[7] Nauntofte B, Tenovuo J, Lagerlöf F. Secretion and composition of saliva. In: Fejerskov O, Kidd EAM, editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. p. 7-27.

No author given

[8] World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

Reference from electronic media

[9] National Statistics Online—Trends in suicide by method in England and Wales, 1979-2001. www.statistics.gov.uk/downloads/theme_health/HSQ 20.pdf (accessed Jan 24, 2005): 7-18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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