Morbidity Profile and Seasonal Variation of Diseases in a Primary Health Center in Kanpur District: A Tool for the Health Planners

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Abstract

Objective: The objective of this study was to determine the morbidity profile of patients being treated at the Primary Health Center, their distribution according to gender, and the seasonal trend of diseases. **Materials and Methods:** The study was done retrospectively using secondary data, over a period of 1 year from June 2007 to July 2008, at the OPD of the Primary Health Center at Patara in Kanpur District, India. The study was aimed to study the pattern of diseases according to the classification provided by the Government of India. The data were collected from the OPD registers of the consultant medical officer, and the diagnosis was classified into communicable diseases, nutritional and metabolic disorders, infectious diseases, obstetric complications, and other diseases including injuries. **Results:** A total of 6838 patients had been treated at the OPD, which included 2707 males and 4131 females. It was observed that, while communicable diseases constituted about half of the total burden of the diseases with skin infections being the commonest; the non-communicable diseases constituted about one-fifth of the total disease burden. Significant gender differences were evident in the prevalence of certain diseases such as worm infestation, acute respiratory tract infection, urinary tract infection, reproductive tract infection, chronic obstructive pulmonary disease, gastritis, arthritis/gout, falls/injuries/ fractures, anemia, pyrexia of unknown origin, and snake bite. Most of the diseases were observed to have a seasonal variation, with the communicable and infectious diseases peaking in the monsoon months. Surprisingly, the non-communicable diseases such as gastritis and falls and injuries also showed a seasonal variation. **Conclusion:** Many diseases have a seasonal variation and the burden of these diseases could be reduced if we devise measures to detect the changes in their trend through the implementation of surveillance programs in this part of the world, as has been carried out in other countries. The knowledge of the burden of the diseases would also assist the health administrators in judicious allocation of the resources.

Keywords: Communicable diseases, non-communicable diseases, seasonal variation

Introduction

A comprehensive analysis of the epidemiological pattern of the occurrence of various diseases in a region or a health care setting, in particular, equips the physicians with the necessary information to diagnose and treat them effectively and timely. It also provides an efficient tool to the policy makers and administrators for the formulation of policies to circumvent the effect of the morbidity and mortality due to these diseases as well as reduce the overall burden of the illness in the community. Many countries in the world have taken steps for the strengthening of the surveillance system for the communicable as well as non-communicable diseases which are slowly and steadily spreading their tentacles from the developed to the developing countries. The issue was bolstered by the World Health Assembly in the year 1995, when it advocated the strengthening of the surveillance of the diseases for the early detection of the emerging or the reemerging infections.[1] A constant watch on the changing pattern of the diseases provides us an opportunity for timely intervention as well as monitor the progress of the ongoing disease control programs and helps in optimizing the allocation of the limited resources. The success of a surveillance program depends on the "Recognition" of the diseases, the timeliness

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and completeness of the "Reporting," and the effectiveness of feedback "Response."[2]

Hippocrates mentioned the effects of seasons on health as early as 460–377 BC in his writings.[3] The effect of environmental factors on various diseases has been a subject of concern over the years. This descriptive study will help us to formulate etiological hypothesis of the various diseases, especially with respect to the environmental factors. The best source of such data is the hospital records as they are easily available and require fewer resources. In this study, the distribution of various diseases as recognized and classified by the health assistant who is the health functionary at the Primary Health Center (PHC) is presented.

According to the institutional framework of the rural health delivery system in India, the PHC functions as the first contact point for basic health services.[4] At present, there is one PHC covering about 30,000 (20,000 in hilly, desert, and difficult terrains) or more population. For a successful primary health care program, effective referral support to the Community Health Center (CHC) is provided, which caters to a population of 80,000–120,000. This center provides the basic specialty services in general medicine, pediatrics, surgery, obstetrics and gynecology. The present study was carried out at the PHC at Patara which is situated in Kanpur district of Central India. The rural health care delivery system of the district is composed of a hierarchy of 134 sub-centers, 5 PHCs, and 5 CHCs spread over a population of about 13 lakhs in 10 Community Development Blocks in the district.[5]

The objectives of the study were to:
1. Obtain information on morbidity patterns of the patients being treated at the PHC;
2. Study the overall morbidity with respect to the distribution according to gender; and
3. Find out the seasonal distribution of the diseases.

Materials and Methods

Study design
This study was carried out retrospectively among the patients attending the outpatient health facility of the PHC at Patara, with the aim of achieving the above-stated objectives.

Sample size and period of study
Data were collected regarding the self-reported health problems during the period of 1 year from June 2007 to July 2008 for which the patient sought treatment at the PHC. A total of 6838 visits were made by the patients to the PHC during the 1-year period. These included the visits by 2707 males and 4131 females.

Tools used and methods of data collection
The data were collected from the OPD registers of the consultant medical officer, and the diagnosis was classified into communicable diseases, nutritional and metabolic disorders, infectious diseases, obstetric complications, and other diseases

including injuries. The communicable diseases have been further subclassified into immunizable, vector-borne, water-borne, and other communicable diseases. With an ensuing epidemiological transition, the importance of the non-communicable diseases in the developing world cannot be overlooked. We have therefore extracted the data of non-communicable diseases from that of the other diseases and injuries in order to see their seasonal variation and separate significance.

Exclusion criteria
We have excluded the cases of the obstetrical complications from the analysis and have thus not presented them in the results because their number was negligible.

Statistical analysis
The data were entered and analyzed using the Microsoft Excel and EPI info version 6. The total number of the patients suffering from the different diseases and their percentages in the different months and according to the gender was calculated. Discrete data were analyzed using Pearson's Chi-square test to see the significance of the observed differences between the males and females. P values <0.05 were considered significant. Line graphs were drawn to depict a comparative account of the seasonal variation of different diseases, which included five most frequently diagnosed communicable diseases, six most common infectious diseases, and five non-communicable and other diseases each.

Results

It was observed that skin infections were the most commonly diagnosed diseases followed by the acute respiratory tract infections (ARI). Second only to the group of infectious and other communicable diseases, the water-borne communicable diseases (16.9%), which accounted mainly of the diarrheal disease and worms' infestation, were found to be the major contributors to the morbidity [Table 1].

Chronic obstructive pulmonary disease (COPD) (34.5%) was found to be the most commonly diagnosed non-communicable disease, followed by gastritis, falls/injuries, and arthritis. Pyrexia of unknown origin (PUO) contributed to a major proportion of the other diseases.

Significant differences in the distribution of certain diseases were observed between males and females. Among the communicable diseases there was a preponderance of worm infestation (46.4% vs. 37.9%), urinary tract infection (7.3% vs. 4.1%), and reproductive tract infection (7.6% vs. 0.2%) in females, whereas among the non-communicable diseases, gastritis (25.0% vs. 16.0%), arthritis (22.7% vs. 16.9%), and anemia (55.8% vs. 22.2%) were more common in females. On the other hand, ARIs (29.9% vs. 22.0%), COPD (37.5% vs. 32.3%), falls/injuries/ fractures (25.4% vs. 16.9%), avitaminosis (77.8% vs. 44.2%), PUO (23.5% vs. 14.9%), and dog bite (1.7% vs. 0.3%) were more commonly reported in males. Snake bites were also more common among

males, however these were too few in number to draw any valid conclusions. About half (50.4%) of the other diseases that could not be classified were also found to be significantly more prevalent among females [Table 2].

The plot for the seasonal variation of the five common communicable diseases revealed an increase in the number of cases suffering from typhoid in the months of June to August. A similar upsurge of the diarrheal diseases and worm infestations was observed in the mid of May [Figure 1].

The seasonal distribution of the other infectious diseases revealed that almost all the diseases had a seasonal variation with the peaks occurring in the months of July and August.

Table 1: Distribution of communicable diseases in the patients attending the OPD at PHC Patara, Kanpur, India

Category of morbidity	Diseases	Male *n* (%)	Female *n* (%)	χ^2 value, *P* value	Total
Communicable immunizable (55) (1.6)*	TB	22 (73.3)	16 (64.0)	0.21, 0.65	38 (69.1)
	Tetanus	5 (16.7)	3 (12.0)	0.01, 0.91	8 (45.5)
	Measles	1 (3.3)	4 (6.0)	1.34, 0.24	5 (9.1)
	Polio/AFP	2 (6.6)	2 (8.0)	0.11, 0.74	4 (7.3)
Total		30 (54.5)	25 (45.5)	-	55
Communicable vector borne (8) (0.2)*	Malaria	5 (83.3)	2 (100)	0.38, 0.53	7 (87.5)
	Filariasis	1 (16.7)	0 (0)	-	1 (12.5)
Total		6 (75.0)	2 (25.0)	-	8
Communicable, water borne (592) (16.9)*	Diarrheal diseases	124 (44.0)	128 (41.3)	0.33, 0.56	252 (42.6)
	Worms	107 (37.9)	144 (46.4)	4.04, 0.04	251 (42.4)
	Typhoid	40 (14.2)	34 (11.0)	1.12, 0.29	74 (12.5)
	Jaundice and Hepatitis	11 (3.9)	4 (1.3)	3.09, 0.07	15 (2.5)
Total		282 (47.6)	310 (52.4)	-	592
Other Communicable and Infectious Diseases (2855) (81.3)*	Skin Inf.	587 (51.3)	850 (49.7)	0.61, 0.43	1437 (50.3)
	ARI	342 (29.9)	376 (22.0)	22.2, 0.00	718 (25.1)
	Ear infection	107 (9.3)	148 (8.6)	0.32, 0.57	255 (8.9)
	UTI	47 (4.1)	125 (7.3)	11.8, 0.00	172 (6.0)
	Sore Eye & Eye complaints	58 (5.1)	81 (4.7)	0.10, 0.75	139 (4.9)
	RTI	2 (0.2)	130 (7.6)	84.1, 0.00	132 (4.6)
	Leprosy	2 (0.2)	0 (0)	1.01, 0.16	2 (0.1)
Total		1145 (40.1)	1710 (59.9)	-	2855
Grand Total 3510 (51.3)		1463 (41.7)	2047 (58.3)	-	3510

*Percentages calculated out of the total patients with communicable diseases, i.e. 3510 patients

Table 2: Distribution of non-communicable and other diseases in the patients attending the OPD at PHC Patara, Kanpur, India

Category of morbidity *n* (%)	Diseases	Males *n* (%)	Females *n* (%)	χ^2, *P* value	Total
Non-communicable diseases 1349 (19.7)†	COPD	211 (37.5)	254 (32.3)	3.80, 0.05	465 (34.5)
	Gastritis	90 (16.0)	197 (25.0)	15.3, 0.00	287 (21.3)
	Falls/injuries/fractures	143 (25.4)	133 (16.9)	14.1, 0.00	276 (20.5)
	Arthritis, gout	95 (16.9)	179 (22.7)	6.55, 0.01	274 (20.3)
	Hypertension	21 (3.7)	24 (3.0)	0.29, 0.58	45 (3.3)
	Epilepsy	2 (0.3)	0 (0)	0.92, 0.17	2 (0.1)
Total		562 (41.7)	787 (58.3)	-	1349
Nutrition and metabolic disorders 140 (2.1)†	Avitaminosis	28 (77.8)	46 (44.2)	10.7, 0.00	74 (52.9)
	Anemia	8 (22.2)	58 (55.8)	10.7, 0.00	66 (47.1)
Total		36 (25.7)	104 (74.3)	-	140
Other diseases 1796 (26.3)†	PUO	152 (23.5)	172 (14.9)	19.9, 0.00	324 (18.0)
	Abdominal pain	107 (16.6)	178 (15.5)	0.29, 0.59	285 (15.9)
	Toothache/mouth pain	80 (12.4)	158 (13.7)	0.55, 0.45	238 (13.2)
	Burns and scalds	7 (1.1)	18 (1.6)	0.39, 0.53	25 (1.4)
	Dog bite	11 (1.7)	4 (0.3)	7.61, 0.00	15 (0.8)
	Snake bite: Nonpoisonous	3 (0.5)	0 (0)	2.93, 0.04	3 (0.2)
	Rabies and animal bite	1 (0.1)	0 (0)	0.09, 0.35	1 (0.05)
	Others	285 (44.1)	620 (53.9)	15.49, 0.00	905 (50.4)
Total		646 (36.0)	1150 (64.0)	-	1796

†Percentages calculated out of the total, i.e. 6838 patients

The variation was more evident in the skin infections and the ARIs [Figure 2].

An attempt to study the seasonal variation of the non-communicable diseases revealed a strange seasonal variation with an increase in the number of cases of COPD occurring in the months of February and December. Gastritis was more common in the months of May and June, while falls and injuries had two peaks in the months of February and June [Figure 3].

Among the other diseases, PUO was maximally diagnosed in the month of July (16.9%). The cases presenting with the tooth ache had two peaks in the month of March and May. Patients suffering with dog bite also had a seasonal variation, but it was not very clearly evident due to the lesser number of cases. People presented with the complaints of abdominal pain throughout the year [Figure 4].

Discussion

The results of the present study indicate that skin infections and ARIs were the most commonly diagnosed diseases. Studies conducted in Pakistan, Saudi Arabia, India, and Nepal have found a similar pattern of diseases, with the most common illnesses being skin infection, ARI, COPD, and PUO.[6-13] A study conducted among the frequent attenders of a primary health clinic observed that musculoskeletal problems were the most common reasons for visit to the health center.[14] Upper respiratory tract infections were found to be the most common illness encountered among adolescents at a primary health care center.[15]

Our results differed from those of Bajracharya *et al.*, who in their study conducted at the PHC in Duwakot near Katmandu found that viral fever, cut/injuries, hypertension, worm infestation, and acid peptic diseases (APD) were the more common diseases.[16] Also, Shanker *et al.* found that ARI was the commonest illness for which treatment was sought (12.6%), followed by wounds and wound infection (10.1%), APD (7.4%), diarrhea/dysentery (6.6%), and worm infestation (5.6%).[17] The results also differed from those of a study conducted in the South Indian families living in three semi-urban areas of Vellore where ARI was the most common infection.[18] This was followed by diarrhea and worm infestation. In a Taiwanese study by Lai *et al.*, the most common illnesses encountered were ARI, skeletal and joint disease, hypertension, and APD.[19] Weekly reports of listed communicable diseases from various departments and centers of Government Medical College, Chandigarh, involved in clinical care and laboratory diagnosis, revealed that out of 14,082 cases of various communicable diseases, 9166 (64.62%) were of ARIs, 3586 (25.78%) of acute diarrheal diseases (ADDs), and 576 (4.10%) were of pulmonary tuberculosis.[20] The variations in the frequency of the occurrence of the various diseases could be attributed to the differences in the environmental and the host factors in the different geographic areas. If the frequency of a certain disease varies in areas with similar environmental conditions, it coerces us to think about the lacunae in either the delivery of health care to the people or an investigation for the search of the host factors leading to the differences.

About half of the disease burden in the outpatient department of the PHC was due to the communicable diseases, while one-fifth was accounted for by the non-communicable diseases. The high
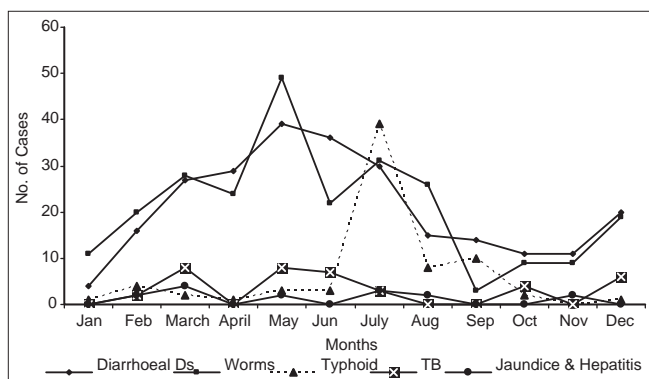

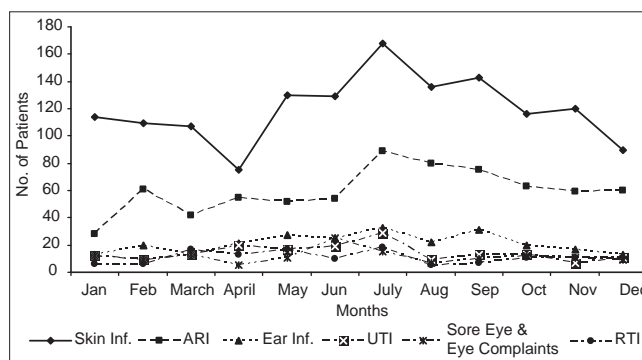**Figure 1:** Seasonal distribution of communicable diseases

Figure 2: Seasonal distribution of other infectious diseases
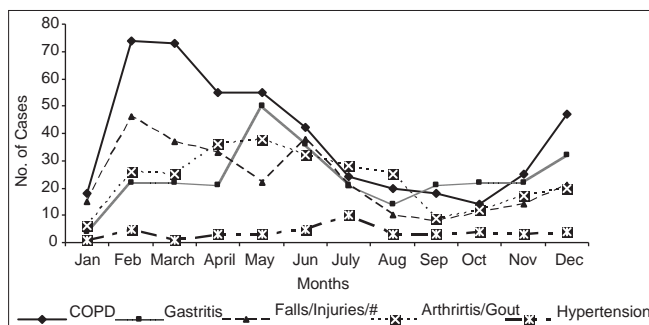

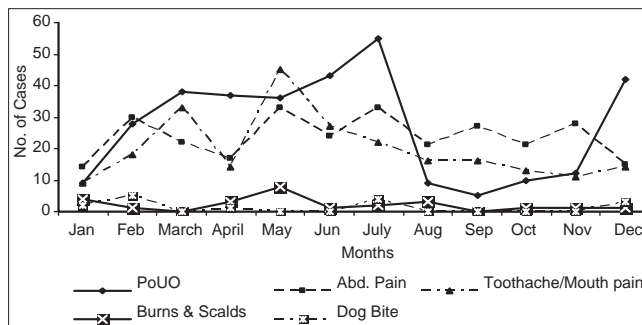**Figure 3:** Seasonal distribution of non-communicable diseases

Figure 4: Seasonal distribution of other diseases

prevalence of communicable diseases conforms to the situation of a developing country where communicable diseases propagate in the environment milieu of malnutrition, poverty, infection, and other social factors. The three big infectious diseases, HIV/AIDS, TB, and malaria, claimed 5.7 million lives worldwide in 2001.[21] The relatively higher number of non-communicable diseases is an indication of the epidemiological transition and serves as an eye opener for the health planners to equip themselves against the diseases of the developed world. Studies from developed nations reveal a prominence of non-communicable diseases such as hypertension, non-articular rheumatism, accidents, and mental disorders in their people.[22]

About 13% of the total diseases could not be classified and could be an indication of either the newly emerging diseases or an inability of the health worker to arrive at an appropriate diagnosis. A further analysis of the unidentified and unclassified diseases could provide us a clue regarding their nature and etiology.

The lower percentage of the communicable, immunizable, and vector-borne diseases is a good sign and gives us an indication of the successful implementation of the various programs for the control of the diseases. On the other hand, the relatively more number of the cases of water-borne communicable diseases and other infectious diseases is a matter of concern and necessitates the implementation of specific programs with a focus on the important diseases contributing to increased morbidity.

The increased occurrence of certain diseases such as COPD, falls/injuries/fractures, dog bite, and snake bite in males is according to the hitherto known preferences of the agent to the host characteristics favoring the occurrence of these diseases in males. The increase in the occurrence of the ARI and avitaminosis cases in the males was rather unusual and the reasons for the same need to be explored. Our findings were different from those of Government Medical College, Chandigarh, which reported a higher proportion of ARI among the females.[20] In a study in a health center in Kathmandu, enteric/viral fever, cut/injury, and allergy were the commonest diseases among males, while viral fever, backache, and allergy were the most common illnesses among females.[16]

Seasonal variation of the diseases, a subject of much epidemiological interest, has been studied for centuries. Temperature, humidity, ultraviolet radiation (UVR), flora, and fauna all change with seasons, and consequently cause a change in the frequency of occurrence of various diseases. The maximum burden of all the diseases as well as communicable diseases in the present study was found in the monsoon months of July, followed by May and June. This is different from the observation made at Government Medical College, Chandigarh, which revealed that the overall reporting of communicable diseases was significantly more during winter and summer compared to the monsoon season.[20] The reason for the observed upsurge of the diseases could be probably the transition phase of the season from summer to rainy which makes the adjustment of the host to the changed weather difficult, thus increasing his/her susceptibility. It also makes the

conditions favorable for the breeding of the vectors and the survival of the agents of the diseases. The seasonal variation corresponding to the seasonal increase in the population of vectors for transmission of the diseases was authenticated by the upsurge of the water-borne diseases such as typhoid, diarrheal diseases, and worm infestations in the end of summer and the start of rainy season. Similarly, other diseases such as skin infections, urinary tract infection (UTI), and ARI were also reported to have a seasonal variation among the outpatients in this part of the world. Similar observations regarding the existence of a seasonal pattern of respiratory, diarrheal, and skin disease were made in a study carried out in over 100 South Indian families from three semi-urban areas of Vellore. This study was, however, not hospital based; rather, it was conducted through house visits undertaken approximately twice each week.[18]

A study conducted in Government Medical College, Chandigarh, also revealed similar seasonal variation as found in our study, with most cases of ARI (76.5%) and pneumonia (3.09%) being reported in winter, ADDs (38.89%) and pulmonary tuberculosis (4.68%) in summer, and typhoid (1.57%) and viral hepatitis (1.23%) in the monsoon season.[20] A larger study population observed over a longer period of time would provide us a clearer picture, and such data on the seasonality of the diseases would assist in the planning and implementation of control measures.

Unlike most of the other previously conducted studies, we tried to find out a seasonal variation of the non-communicable diseases and observed that COPD peaked during the winter months, most probably due to the effect of the temperature. A very peculiar finding was the increase in the number of cases of gastritis in the summers, the reason for which needs to be explored. This contrasted with the observations of Bala Ramachandran, Childs Trust Hospital, who reported that the winter months signal a heavier workload for gastroenterology departments. We also observed a seasonal variation of the accidents/falls/injuries, with two peaks occurring in the winter and the rainy season. A seasonal variation in the occurrence of arthritis was not observed very clearly contrary to the finding by a geriatrician V. S. Natarajan who had found the winters to be unfailingly harsh on the elderly, triggering chest infections and joint problems like arthritis.[23]

Limitations

The case definitions for the classification of the various diseases need to be clearly defined for ensuring comparability. The Government of India has provided a very elaborate classification of the diseases, but the feasibility of the classification and the treatment of these conditions are dubious, more so with the limited resources that the PHCs are equipped with. The classification has included diseases like HIV, encephalitis, typhoid, worm infestation, hepatitis, ectopic pregnancy, mental disorder, PUO, etc., which require expertise and diagnostic facilities for the correct diagnosis. The results of the present study are based on the classification of the diseases done by the health assistant who is a paramedical worker and is poorly equipped with the

diagnostic facilities for the confirmation of the diagnosis of the cases. We also need to study the seasonal variation of the diseases over a longer period of time spanning over years to draw a precise statement regarding the consistency of the seasonal variation. Nevertheless, the findings of the study are helpful to the health planners for the judicious allocation of the limited resources and further exploration of the association of the factors with the occurrence of the diseases for the achievement of the optimal health of the people.

Conclusion

Many diseases have a seasonal variation and the burden of these diseases could be reduced if we take measures to detect the changes in their trend through the implementation of surveillance programs in this part of the world, as has been carried out in other countries. The reasons for the seasonal variation of certain diseases such as gastritis, falls/injuries, PUO, and toothache need to be explored further. Control of the communicable diseases may entail measures for enhancing the socioeconomic development along with specific health measures for a sustained effect.

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