Original Article

Management of Pediatric Asthma

Prevalence and Management of Pediatric Asthma in Urban Versus Rural Settings

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ABSTRACT

Objective: In order to explore differences such as the frequency and treatment of pediatric asthma between urban and rural populations, and to understand what main environmental and healthcare explanatory factors exist.

Study Design: A cross-sectional study.

Place and Duration of Study: This study was conducted at the Department of Pediatrics, Peoples university of Medical Health Sciences Nawabshah from January 2024 to July 2024.

Methods: This study recruited 110 patients with paediatric asthma 55 urban and 55 rural aged between 6 and 12 years. Self-administered questionnaires and chart abstraction were used to obtain demographic, clinical, and health care use information regarding asthma incidence, manifestations, therapeutic management, and utilization of health services. Descriptive quantitative data analysis was done by comparing means using t-tests and comparing frequencies using chi-square tests for rural and urban data. Accepting the significance level of $P < 0.05$, all analyses were performed using SAS 9.2.

Results: Out of the 110 patients 60% were accorded the disease in urban areas with 40% from rural areas. Means and standard deviations were calculated for the total sample and according to the place of residence: means asthma symptom score for urban children was 7.4 (SD 2.3) and for rural children- 5.6 (SD 1.9). We also found that urban children were more likely to use inhalers ($p = 0.04$), and rural children had poorer medication compliance ($p = 0.03$). They also reported the following on healthcare access; children in the urban areas received check-ups as often as recommended ($p= 0.01$).

Conclusion: Specifically, children who have asthma are more notice and managed well in urban areas than in rural areas. Factors such as inadequate availability of health services and environmental factors accountable for these disparities that suggest the importance of focused efforts to address poor asthma prognosis in rural localized communities.

Key Words: Childhood asthma, urban and rural settings, accessibility to healthcare, factors environmental.

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INTRODUCTION

Asthma is one of the most common chronic diseases in children and young people and is observed in children globally, though their occurrence appears organized by geographic location. The nature of the disease means that children often suffer from inflammation of their airways which when irritated, cause them the bad coughs, the wheezing and the breathlessness associate with asthma. Several researches have examined the relationship that exists between the incidence and treatment of asthma between the urban and rural populations. The reasons for that include environmental factors, the abilities to access healthcare, socioeconomic conditions, and life styles significantly differing. In urban areas, the children have been exposed to environmental pollutants including air pollution from vehicle emissions, industrial emissions, and allergies in the house which have made the asthmatic rate high among children[1]. PM2.5 and NO2 emissions caused by air pollution are known risk factors that can cause asthma or worsen cases of the disease[2]. Also, more children in urban areas live in compact housing with less opportunity for exposure to fresh air, and more exposure to indoor allergens such as dust mites, mold and animal fur that worsen asthma[3]. While urban settings are characterized by high population density, high levels of pollution and swathes of built environment, rural environments present opposite factors in terms of pollution and space but present their

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own unique barriers to asthma diagnosis and management. In farming areas patients may be comparatively have limited access to healthcare service, fewer pediatricians or asthma management resources[4]. Such a limitation reduces the chances of early diagnosis, treatment compliance and ultimately, prognosis of the extent of poorly controlled asthma[5]. Further, the children in the rural areas may less likely to be diagnosed or misdiagnosed as they assume the asthma symptoms relate to other ailments such as allergies or colds[6]. It has also been reported in several clinical surveys that socioeconomic factors largely determine the incidence and control of asthma. In urban facilities, people with low income have higher prevalence of asthma due to factors such as housing, pollution and health care facility[7]. However, rural populations generally have a lower prevalence of asthma but poorly managed and with less access to adequate asthma care, hence worsened health[8]. However, to the current authors' knowledge, there is limited high-quality empirical research that directly contrasts the prevalence of pediatric asthma between urban and rural communities as well as the strategies employed in such comparisons. Much of the work on one of them is made without reference to variables inherent in the other. It is profound that distinguishing these differences can help design optimum strategies for managing pediatric asthma, especially in regions with limited pediatric asthma care access. The purpose of this research work is to determine how often asthma is diagnosed in children; whether it occurs more often in rural or urban areas of the country; and elements which may explain the differences in the results. Since this research will rely on scores from the asthma diary generated during the study for children in both home and school setting, healthcare access, as well as differences in treatment adherence, it will seek to establish disparities in asthma care and have suggestions for improvements as the study findings[9].

METHODS

This cross-sectional study was conducted in two distinct regions: one urban and one rural. The cross-sectional descriptive study recruited 110 children with a diagnosis of asthma, 55 from urban areas and 55 from rural areas and ranged from 6–12 years. Both quantitative and qualitative data were obtained by means of questionnaires, clinical record and parental interviews. These children were included if they have a past history of Asthma and if they have been on treatment for this condition in the last six months. Special permission for this study was granted by the Institutional Review Board; the parents of all participants signed the consent form. Participants with other chronic respiratory diseases like cystic fibrosis or congenital lung disease were also not allowed to join.

Data Collection: The questionnaires included asthma symptoms severity, health care access, and treatment history. Clinical records supplemented the present data regarding medical treatment and management of medications. Socio-economic status and environmental exposures data were obtained from parent interviews. The questionnaires were piloted several times in order to understand their reliability and validity for use.

Statistical Analysis:

Quantitative data collected where analyzed using the Statistical Package for Social Sciences (SPSS) version 24. Demographic and clinical features in descriptive analysis are displayed using mean, standard deviation and percentage. For comparing the asthma prevalence, symptom severity, and management practices between the urban and rural children t-test for independent samples and chi-square test were used. A significance level of 0.05 or less was used to compare the study's findings.

RESULTS

Of the 110 participant being children with asthma, 55 were drawn from the urban setups and the other 55 from the rural backgrounds. The mean age of participants was 9.2 years SD=2.1. Mean asthma symptom score in the urban group was found to be 7.4 (SD=2.3) while it was 5.6 (SD=1.9) in rural groups. This difference was statistically significant ($P< 0.05$). The two groups of children also differed significantly in their inhaler usage, with the urban children using inhalers more frequently (72%) than rural children (48%), p=0.04. Nevertheless, regarding the compliance to correspondingly prescribed medications, rural children received less of the medications, 45 % if to compare with 68 % of children from urban areas (Odds ratio 0.45, 95 CI 0.26 – 0.80, p=0.03). The percentage of children who had follow up was higher among the urban children 80% as compared 55% among the rural children. This was a statistically significant difference p = 0.01. According to the descriptive analysis done, rural children preferred to be attending general practitioners rather than specialist physicians hence the treatment that they would receive is likely to be less effective for asthma since the diagnosis is also likely to be less effective. Furthermore, more children living in urban centres received a significant asthma care plan and effective preventive medication and control measures than their counterparts from the rural areas. Of the environmental exposures, there was higher exposure to air pollution and indoor allergens among the urban children, which was in agreement with their asthma symptom scores. Though the parents and guardians of the rural children were aware that they had lesser exposure to environmental pollution, they lacked easy access to resources to enable better, long-term control of the children's asthma.

Table No. 1: Demographic Characteristics of Participants

Characteristic	Urban (n=55)	Rural (n=55)	Total (n=110)
Mean Age (years)	9.2 (SD=2.1)	9.1 (SD=2.0)	9.2 (SD=2.0)
Gender			
- Male	30 (54.5%)	28 (50.9%)	58 (52.7%)
- Female	25 (45.5%)	27 (49.1%)	52 (47.3%)
Asthma Symptom Score	7.4 (SD=2.3)	5.6 (SD=1.9)	6.5 (SD=2.1)
Age Group (6-9 years)	32 (58.2%)	29 (52.7%)	61 (55.5%)
Age Group (10-12 years)	23 (41.8%)	26 (47.3%)	49 (44.5%)

Table No. 2: Asthma Treatment Practices by Region

Treatment Type	Urban (n=55)	Rural (n=55)	Total (n=110)
Inhaler Use	40 (72%)	26 (48%)	66 (60%)
Medication Adherence	38 (69%)	24 (44%)	62 (56%)
Regular Follow-up Visits	44 (80%)	30 (55%)	74 (67%)
Preventive Medications	35 (63%)	22 (40%)	57 (51%)

Table No. 3: Healthcare Access and Symptom Control

Healthcare Access/Control Measure	Urban (n=55)	Rural (n=55)	Total (n=110)
Regular Follow-up (≥ 3 visits/year)	44 (80%)	30 (55%)	74 (67%)
Primary Care Visits (GP vs. Specialist)	21 (38%)	14 (25%)	35 (31%)
Symptom Control (Good/Moderate)	46 (84%)	34 (62%)	80 (73%)
Asthma Severity (Severe/Moderate)	9 (16%)	21 (38%)	30 (27%)

Table No. 4: Environmental Exposures and Asthma Symptoms

Environmental Exposure	Urban (n=55)	Rural (n=55)	Total (n=110)
Exposure to Air Pollution (High)	41 (75%)	15 (27%)	56 (51%)
Exposure to Indoor Allergens (High)	37 (67%)	22 (40%)	59 (54%)
Exposure to Pollen (High)	29 (53%)	42 (76%)	71 (65%)
Frequent Coughing/Shortness of Breath	41 (75%)	27 (49%)	68 (62%)

DISCUSSION

This study shows that there are wide gaps on cases of pediatric asthma in urban and rural facilities. This evidence can be compared to several recent works which have identified urban environment as having better asthma management and higher prevalence of the disease whereas rural environment is associated with limited access to medical care and suboptimal control of its symptoms. However, the pathways explaining these differences remain multiple and often are interrelated. Consistent with the studies presented in this paper, current research has established that conditions in urban areas defined by greater concentration of pollutants in the air, are instrumental in the development of asthmatic conditions in children[10]. According to Zhang et al. (2020) children are at higher risks of developing asthma or experiencing an asthma exacerbation due to exposure to traffic related air pollution or fine particulate air pollution from the urban environment[1]. In the same way, Lee et al (2019) found that while living in higher apartment buildings, urban children are more exposed to indoor allergens such as mold and dust mite due to limited indoor ventilation which compounds the symptoms of asthma and poor control of the disease among children. These environmental factors are supported by findings that indeed the urban group had a higher asthma symptom scores from this study (mean = 7.4)[2]. The current study's outcomes are also consistent with findings that Richards et al. (2018) established that while the asthma prevalence was lower in rural clients, their management results were worse than those of urban clients. This means that children especially in the rural regions are less likely to presented early and receive adequate asthma control because for most of them access to doctors and other specialists are limited[3]. This is in concordance with the observed result that rural children in the present study had relatively poor compliance to medications and less frequent follow up appointments compared to children from urban settings. This poor healthcare utilization has been blamed on the fewer health facilities, and paediatricians in rural areas, as argued by Lee and Lim (2017) who noted that rural families have poor access to asthma education programs and special care, which results in poor asthma control, and higher hospitalization rates[4]. Similarly, the lower rates of inhaler use and medication compliance found in the rural children match the findings of Wang et al. (2021), who noted that children in the rural areas especially have lower comply rates with prescribed asthma medications, not only because of knowledge deficiencies and resource constraints but also because of cultural reasons[5]. This combined with poor compliance to asthma controller medications in rural areas, less follow up visits, worsens asthma and raises

predisposition to an asthma attack, as proved in this research study. Another area where research outcomes were found in this study is the economic aspects. Thus, children from lower SES have poorer asthma outcomes because they reside in genetically less healthy environments with higher amounts of pollution and poor-quality housing. A study by Zhou et al. (2022) concluded that poverty coupled with urban residency reflected our findings of increased asthma morbidity and increased emergency department visits and hospitalizations[6]. For children in rural areas, poverty reduces the ability to access basic asthma medications and other health facilities making it even harder for them to manage the condition[11]. In fact, the studies such as that of Patel et al. have revealed that owing to better infrastructure and excellent reach to the specialist in the urban regions there have been more elaborate systematic approaches to overall asthmatic control including strict monitoring and preventive care likely to yield optimal urban asthmatics than they do in rural or less developed area[8]. However, even fewer asthma cases, rural children receive worse treatment because the preventive measures are not as available to them. In conclusion the research brought into perspective the necessity of environmental exposures and healthcare access criteria in the development of pediatric asthma. Subsequent study should aim at identifying how future changes in environmental policy in urban settings may decrease the cases of asthma and identifying how rural areas can enhance the health care systems to reduce the impact of asthma.[12-16]

CONCLUSION

Our finding shows that urban and rural areas in terms of the occurrence and treatment of pediatric asthma. Prevalence: urban children have a higher prevalence of asthma than rural children but urban children also have better control over their asthma symptoms and access to healthcare services compared to rural children Diagnosis: rural children are diagnosed later than urban children through their symptoms purely because they can't afford to go to the hospital Medication: rural children also do not adhere strongly to their prescribed medication and have poorer follow up care compared to urban children. Such disparities call for relevant neighbourhood interventions in countryside that focuses on asthma control and healthcare access.

Limitations: There are several research limitations within the study, mainly because the research design is cross-sectional; thus, it does not qualify for causality tests. Furthermore, the relative sample might not be generalizable enough to the rest of the urban and rural inhabitants, and other uncontrolled confounding factors may include income levels, genetic factors, and many others that relate to asthma outcomes.

Future Findings: Future research should undertake follow-up studies to determine the impact urban/rural setting on asthma status at advanced stages. Furthermore, these studies may shed light on how to evaluate the efficacy of specific measures – for example, the extension of the mobility service for asthma patients in rural areas or the acquisition of new environmental standards in urban environments.

Abbreviations:

- BJA: Bureau of Justice Assistance
- SPSS: Statistical Package for the Social Sciences
- SD: Standard Deviation
- p-value: Probability Value
- GP: General Practitioner
- PM2.5: Particulate Matter 2.5
- NO2: Nitrogen Dioxide
- ER: Emergency Room

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Author's Contribution:

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