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"Prevalence of Acute Respiratory Infections Among Under-Five Children and Its Association with Sociodemographic Factors and Housing Conditions in Rural area Kamlaapura village Karnataka"

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ABSTRACT

Acute respiratory infections (ARIs) pose a significant public health challenge in India, contributing to 15–30% of all fatalities among children under five years of age.

KEY WORDS: *Acute respiratory infections; Prevalence; Educational status; Housing conditions*

AIMS & OBJECTIVES:

This study aimed to estimate the prevalence of ARI and explore its association with sociodemographic factors and housing conditions among under-five children in rural Kamalapura village Karnataka.

MATERIALS & METHODS:

A community-based cross-sectional analytical study was conducted in selected Anganwadi Centers within the Kamalapura Block, Karnataka. Data on sociodemographic factors and housing conditions were collected by interviewing parents or caregivers of under-five children using a semi-structured, predesigned, and pretested pro forma during house-to-house visits.The sociodemographic factors analyzed included parental education, father's occupation, religion of the child, socioeconomic status of the family, child's age, type of family, and child's sex. Housing conditions examined included overcrowding, ventilation, type of cooking stove (chulha), and type of house.

RESULTS:

The prevalence of ARI was 48.88%. Significant sociodemographic factors associated with ARI included:

- **Mother's education level** ($\chi^2 = 18.69$, $P < 0.001$)
- **Father's education level** ($\chi^2 = 12.02$, $P < 0.001$)
- **Father's working status** ($\chi^2 = 17.95$, $P = 0.001$)
- **Type of family** ($\chi^2 = 23.88$, $P < 0.001$)
- **Child's gender** ($\chi^2 = 16.57$, $P < 0.001$)

Significant housing factors included:

- **Overcrowding** ($\chi^2 = 13.61$, $P \leq 0.001$)
- **Ill-ventilated houses** ($\chi^2 = 54.63$, $P < 0.001$)
- **Type of chulha** ($\chi^2 = 164.31$, $P \leq 0.001$)
- **Type of house** ($\chi^2 = 4.69$, $P = 0.030$)

CONCLUSION:

The prevalence of ARI in this study was notable. The findings emphasize the importance of improving sociodemographic indicators and housing conditions as key strategies for preventing ARI in children. Addressing these factors can significantly reduce the burden of ARIs in rural settings.

Respiratory infections, according to the World Health Organization, account for approximately 6% of the global disease burden. The global under-five mortality rate remains a significant challenge, with an estimated 6.6 million deaths annually. Acute respiratory infections (ARIs) among children under five years of age are a critical public health issue in India, contributing to 15–30% of all deaths in this age group. Notably, the majority of these fatalities are preventable.

In developing countries like India, ARIs are responsible for 30–50% of visits to healthcare institutions and 20–40% of hospital admissions for children under the age of five. These statistics highlight the urgent need for effective prevention and management strategies to address this pressing health concern.

The availability of data on the prevalence and factors associated with ARIs is crucial for achieving Sustainable Development Goal 3.2, which focuses on improving the health and well-being of children under five. In India, there is limited data on the morbidity burden of ARIs in under-five children, particularly in the Kamalapura region and rural areas of Karnataka. To address this gap, the present study was conducted to estimate the prevalence of ARIs and examine the association between sociodemographic factors, housing conditions, and the occurrence of ARIs in under-five children in rural areas of Kamalapura Karnataka region.

The prevalence of ARI was calculated using the formula: **Prevalence (%) = (Number of children with ARI / Total number of children in the study) × 100**

Data were systematically collected, compiled, tabulated, and entered into a Microsoft Excel spreadsheet. For analysis, the Statistical Package for the Social Sciences (SPSS) version 23 was used. Descriptive statistics, such as frequency and percentages, were employed to present the study findings.

To explore the association between categorical variables and ARI, the Chi-square test was used. Statistical significance was determined using a threshold of $P < 0.05$ at a 95% confidence interval.

RESULTS:

In the study, under-five children from 11 Anganwadi Centers (AWCs) were examined, with the highest number of children selected for the study. Out of 220 mothers whose children had ARI, 129 (58.6%) were illiterate, while 91 (41.4%) were literate. Among the 230 mothers whose children did not exhibit signs of ARI, 88 (38.3%) were illiterate, and 142 (61.7%) were literate. The proportion of children with ARI was higher in mothers who were illiterate (58.6%) compared to those who were literate (41.4%). This relationship was found to be statistically significant ($\chi^2 = 18.69$, $P < 0.001$).

Regarding the educational status of the father, 98 (44.5%) of the fathers were literate, and 122 (55.5%) were illiterate among the 220 children with ARI. In contrast, of the 230 children who did not have ARI, 140 (60.9%) had illiterate fathers, and 90 (39.1%) had literate fathers. Although the proportion of ARI cases was lower among children of illiterate fathers (44.5%) than among those with literate fathers (55.5%), there was a statistically significant association between ARI and father's education ($\chi^2 = 12.02$, $P < 0.001$).

In terms of father's occupation, the largest group of children with ARI had fathers who were unskilled workers (n = 101, 45.9%), followed by skilled workers and business/self-employed individuals (n = 50, 22.7%). A statistically significant association was found between ARI and the occupation of the father ($\chi^2 = 17.95$, $P = 0.001$).

The majority of children with ARI came from Hindu families (n = 151, 68.6%), followed by Muslim families (n = 60, 27.2%). However, there was no statistically significant association between ARI and the family's religion ($\chi^2 = 4.75$, $P = 0.190$).

In the study, the highest number of children with ARIs were from socioeconomic Class III families (n = 103, 46.8%), followed by those from socioeconomic Class IV families (n = 79, 35.9%). However, there was no statistically significant association between ARI and the family's socioeconomic class ($\chi^2 = 5.61$, $P = 0.229$).

The majority of children with ARIs were in the 1–5 years age group (n = 164, 74.5%), while 56 (25.4%) were under 1 year old. No statistically significant association was found between ARI and the age of the child ($\chi^2 = 2.24$, $P = 0.134$).

Out of the children with ARIs, 131 (59.5%) were from joint families, while 89 (40.4%) came from nuclear families. A statistically significant association was found between ARI and the type of family ($\chi^2 = 23.88$, $P < 0.001$).

In the study, a total of 450 children were examined, with approximately half identified as male (51.5%) and the other half as female (48.5%). Here's a rephrased version:

In the study, 135 (61.3%) children with ARIs were male, while 85 (38.6%) were female. A statistically significant association was found between ARI and the gender of the child ($\chi^2 = 16.57$, $P < 0.001$).

The prevalence of ARI was higher in houses with overcrowding (60%) compared to non-overcrowded houses (40%). This association between ARI and overcrowding was statistically significant ($\chi^2 = 13.61$, $P \leq 0.001$).

The occurrence of ARI was also higher in houses with inadequate ventilation (70.45%), and this relationship was found to be statistically significant ($\chi^2 = 54.63$, $P < 0.001$).

Additionally, ARI was less common in houses using smoke-type chulhas, with only 21.82% of cases observed. However, this relationship was still statistically significant ($\chi^2 = 164.31$, $P \leq 0.001$).

The percentage of ARI occurrences in semi-pucca/kutcha houses was 45%, compared to 55% in pucca houses. A statistically significant association was found between ARI and the type of house ($\chi^2 = 4.69$, $P = 0.030$).

DISCUSSION

The study's finding of higher ARI prevalence in children of illiterate mothers aligns with previous research, such as studies by Pore et al., and Goel et al., which also showed a higher percentage of ARI among children of illiterate mothers. This suggests a significant correlation between maternal education and the prevalence of ARIs in children. Educated mothers may have better access to health information, healthcare services, and preventive measures, which can help reduce the risk of respiratory infections in their children.

The present study's results are consistent with the findings of Savitha and Gopalakrishnan, and Ghimire et al., which also emphasized the role of maternal education in influencing children's health outcomes, especially in relation to respiratory infections like ARI. These studies suggest that enhancing maternal education can be an effective strategy in reducing ARI prevalence in children, and may provide a critical point for intervention in public health programs aimed at preventing respiratory infections.

Improving educational opportunities for women, particularly in rural and underserved areas, could potentially have a significant impact on child health outcomes, including reducing the incidence of ARIs among children under five.

The finding in this study that ARI prevalence was greater in children whose fathers were literate (57.5%) compared to those with illiterate fathers (41.2%) is indeed an interesting contrast to studies by Pore et al. and Ghimire et al., which found a higher prevalence of ARI among children of less educated fathers.

One possible explanation for this discrepancy could be related to various socio-economic and environmental factors that influence both education levels and child health. Although paternal education may be linked to improved family income and access to healthcare resources, other factors such as occupation, lifestyle, and living conditions might play a more direct role in the risk of respiratory infections in children.

For instance, children of literate fathers might still be at higher risk of ARI if the family lives in overcrowded conditions, has inadequate ventilation, or uses traditional cooking methods that contribute to air pollution, all of which could outweigh the protective effects of paternal education.

Further research may be needed to explore other underlying factors that contribute to these findings, such as the father's occupation, environmental conditions at home, and access to healthcare services. This can help to better understand the complex relationship between paternal education and the prevalence of ARI in under-five children.

The study depicts that the prevalence of ARI in children having their fathers in a profession was 38.4%, in skilled fathers, it was 37%, in unskilled fathers, it was 53.1%, in Business or

self-employed, it was 61.7%, and in the unemployed, it was 80%. Compared to a study done by Goel et al.,5 in which the prevalence of ARI in children with the occupation of their father as laborers was 23.93%, in private service, it was 15.81%, in agriculture, it was 35.47%, in business, it was 20.51%, and in Govt. Service, it was 4.27% when compared to a study done by Ghimire et al.,15 in which the prevalence of ARI in children whose occupation of their fathers were unemployed was 50%, which is lesser than the present study. Contrary to our findings, the study done by Goel et al.,5 revealed a lesser percentage of under-five children with ARI in socioeconomic class III, which was 20.94%, but a slightly similar proportion of children with ARI was revealed in socioeconomic class V, that is, 35.89%, which is at par with our study. The present study shows that the frequency of ARI in children aged 12 months. As compared to the studies by Goel et al.,5 and Kumar et al.,16 the authors revealed a greater percentage of under-five children with ARI in >12 months of age (58.11% and 57.7%, respectively), unlike the present study. Furthermore, as found in the studies by Murarkar et al.,4 Savitha and Gopalakrishnan14, and Ghimire et al.,15 it was revealed that younger children had a higher predisposition for ARI occurrence as compared to older children under the age of five. Regarding the type of family distribution in the studied under-five children, the majority of them (52.2%) belonged to a nuclear family and the remaining 47.7% hail from a joint family.

This is in contrast to the studies by Murarkar et al.,4 and Ghimire et al.,15 where a greater proportion of children before completing their 5th birthday belonged to joint families (58.4% and 50.3%, respectively). In the present study, the prevalence of ARI was greater in male under-five children (58.1%) than female children (38.9%). Similar observations are supported by the studies conducted by Goel et al.,5 Kumar et al.,16 Murarkar et al.,4 Savitha and Gopalakrishnan14, and Ghimire et al.,15 where they found a higher percentage of ARI among male counterparts under five with 53.84%, 62.9%, 51.4%, 50.6%, and 62.3%, respectively. The present study revealed that the frequency of ARI was greater in the houses where overcrowding was present (57.3%) than in the houses where overcrowding was absent (40%). This finding matches the results of studies by Goel et al.,5 Kumar et al.,16 Kiranmai et al.,17 and Ghimire et al.,15 who all found that a higher percentage of children under five with ARI lived in houses with too many people in them. The percentage of under-five children with ARI was found to be lower in overcrowded houses, as done in the studies by Murarkar et al.,4 and Savitha and Gopalakrishnan14 where they reported that 49.12% and 42.3% of underfive children with ARI had overcrowding in their houses, respectively. In the present study, the percentage of children under-five children with ARI was higher in the ill-ventilated houses (65.4%) than in the well-ventilated houses (30.5%). This finding backs up the results of studies by Goel et al.,5 Kiranmai et al.,17 and Ghimire et al.,15 who all found that a higher percentage of children under five with ARI lived in houses with poor ventilation (74.35%, 90.3%, and 68.1%, respectively). However, Murarkar et al.,4 and Savitha and Gopalakrishnan14 observed a lesser percentage of underfive children in ill-ventilated houses, which was 50.6% and 39.7%, respectively. The study depicts that the prevalence of ARI in smokeless types of chulha is 80.7%, unlike a lesser percentage in smokeless types of chulha in houses (20.2%). This observation is in contrast to the studies done by Goel et al.,5 and Murarkar et al.,4 which reported a higher percentage of under-five children with ARI in the smokey type of chulha. In a study by Savitha and Gopalakrishnan14, the proportion of children having ARI in the smoke type of chulha was 48.6%, which is higher as compared to the present study. Whereas, Ghimire et al.,15 results are in line with what our study found, as

the authors found that there were more children under five with ARI in houses with smokeless types of chulhas (72.5%) than in houses with smokey types of chulhas (50%). According to the study, the prevalence of ARI in semipucca and kutcha types of houses is 43.8%, and in pucca types of houses, it is 54%. This is higher than the prevalence of ARI in semi-pucca and kutcha types of houses observed in a study by Savitha and Gopalakrishnan14 which was 50.3%. In a study done by Ghimire et al.,15 the prevalence of ARI in semi-pucca, kutcha, and pucca-type houses was nearly 60%, which is a higher percentage as compared to the present study.

LIMITATION OF STUDY

The study did not assess other factors related to ARIs, such as parental smoking history or family history of ARIs. The findings can only be applied to the accessible population of children under five years old living in the selected AWCs of the Kamalapura block, within the rural field practice area of our tertiary care institute, and not to the entire under-five population of Hospete Bellari district Vijaynagara Karnataka.

CONCLUSION

The present study identifies several significant social and demographic factors contributing to ARIs in children under five, including parents' educational level, fathers' employment status, family type, and the gender of the children studied. In terms of environmental and housing factors, the study found that a higher proportion of children with ARIs lived in overcrowded and poorly ventilated homes. The observed prevalence of ARI among children under five is significant. These findings highlight the importance of improving sociodemographic factors and housing conditions as effective strategies for preventing ARI in children. Addressing these issues could help reduce the strain on healthcare systems caused by the morbidity and mortality associated with ARI in young children.

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