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Original Article

Investigating the epidemiological trend of pediculosis from 2016 to 2022 in Babol city, Iran

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Background: Lice are widespread on a global scale and afflict all socioeconomic classes. The infestation of humans by lice is commonly called pediculosis. Despite advancements in health and medical science, human lice are still a health problem. Therefore, the present study investigated the prevalence of pediculosis and its related factors from 2016-2022 in Babol City, Iran.

Methods: In this descriptive-analytical study, the information of individuals who referred to comprehensive urban and rural health centers, health centers and health houses of Babol City and affiliated hospitals for the purpose of investigating the trend of pediculosis between 2016 and 2022 was extracted from the county health center of Babol City. Data were analyzed using SPSS software version 23. To compare qualitative variables, the chi-square test was used. $P< 0.05$ was considered significant.

Results: According to the results, there were 66197 cases of pediculosis from 2016 to 2022 in Babol City, Iran. Moreover, pediculosis was 4.44 times more common in females than males and 2.31 times more common in rural areas, compared to urban areas. It is worth mentioning that the highest infection rate was related to the 6-12 year age group. The general prevalence of lice infestation was 20.86% in spring, in summer 21.92%, 36.73% in autumn and 20.47% in winter. Study's results showed that the most commonly used treatment was permethrin shampoo and dimethicone lotion.

***Conclusion*:** The results show that age, gender, and place of residence are important variables in the prevalence of pediculosis. Educating people about identifying the growth stages of head lice (nits, nymphs, and adults) and methods of preventing and treating parasites and observing personal hygiene, especially in children, can significantly affect the prevalence of pediculosis.

Keywords: Pediculosis, Trend, Prevalence

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Introduction

Public health plays a crucial role in the development of every community (1). Despite advancements in health and medical education, the presence of external parasitic infestations continues to pose a threat to community health development and remains a public health concern (2). For more than 10000 years, pediculosis (infestation of humans by lice) has been a widespread global concern for human communities, a factor affecting societal health caused by the external parasites called lice (3). The three primary types of lice that can live on humans: Pediculus humanus capitis (head louse), Phthirus pubis (pubic louse), and Pediculus humanus corporis (body or clothes louse) (4). This condition is transmitted directly through person-to-person contact or indirectly via contact with contaminated personal items such as hats, scarves, underwear, towels, and headphones on electrical devices (5, 6). Human lice require the completion of their entire life cycle on hairy human scalps, which involves different stages starting with the egg, also known as a nit, followed by the larva or first mobile instar, two nymphal stages, and then adults (female and male) (7). Female P. capitis prefers to lay eggs around the ears and the nape of the neck while attaching to the hair shaft. The nymph that hatches from the nits matures into an adult within one week. They feed on the head every 4 to 6 hours over an average lifespan of 16 days (8). Common symptoms of pediculosis include bites, itching, allergies, and secondary infections such as dermatitis and jaundice. In children, pediculosis can lead to social issues like insomnia, depression, lack of self-confidence, loss of social status, and even academic failure. Many infected individuals develop secondary infections associated with hair loss, allergies, and other complications due to frequent itching (9). Risk factors for acquiring pediculosis are determined by various factors, such as the number of children in a family, parent's education and occupation, presence of a bathroom at home, frequency of bathing per week, local customs, social contacts, lack of healthcare systems, and the socioeconomic status of the family (10, 11). Pediculosis is controlled in two ways: (1) proactive prevention or (2) post-infestation treatment (12). One of the ways to prevent head lice is to follow personal hygiene, take regular baths and avoid using other people’s belongings (13). Many treatment approaches for head lice include: treatment by the use of chemical insecticides with shampoo formulation as a standard method (1% permethrin shampoo), Treatment with non-neurotoxic chemical products such as dimethicone lotion and Oral treatments (Albendazole, Diethyl carbamazine and oral Ivermectin) (14). The reported prevalence of lice infestation in various provinces of Iran ranged from 1.05% to 29.3%, with percentages such as 1.3% in Hamadan (15, 16), 1.8% in Kerman (17), 2.3% in Asadabad (18), 4.7% in Kurdistan (19), 6.6% in Tabriz

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(20), 7.4% in Mazandaran (21), 8% in Kermanshah (22), 13.7% in Mashhad (23), 27.1% in Iranshahr (24), 29.3% in Qom (25), 23.38% in Khuzestan (11), and 3.2% in North Khorasan Province (26). Furthermore, the prevalence of head lice infestation in other countries was reported as 0.7% in Germany (27), 4.1% in South Korea (28), 5.2% in Saudi Arabia (29), 41.8% in India (30) and 29.7% in Argentina (31). The prevalence of human lice continues to be a health concern, despite the progress in health and medical research. Hence, from 2016 to 2022, the current research examined the occurrence of pediculosis and its associated factors in Babol City.

Methods

Study Area

Babol is a city of great significance in the Mazandaran Province, particularly in terms of its population, economy, and agriculture (32). Located in Mazandaran Province, Iran, Babol County is positioned between latitudes N 40°36′ to N 36°35′ and longitudes E 33°52′ to E 43°51′. The Babol Plain covers an area of 1578 km2 and is home to an urban population of 230973 (33). (Fig.1)

Data Collection

In this descriptive-analytical study, the information of individuals who referred (including sex, age, place of residence, separated by urban and rural, and type of treatment) to comprehensive urban and rural health centers, health centers and health houses of Babol City and affiliated hospitals to the purpose of investigating the trend of pediculosis between 2016 and 2022 was extracted from the health center of Babol City. Among the files of individuals with pediculosis, those who had incomplete information on the variables studied (including sex, age, place of residence, separated by urban and rural, and type of treatment) were inevitably excluded from the study. The population of Babol City was also obtained from the population sources of Mazandaran Province from 2016 to 2022, separated by the investigated groups.

Two weeks after the end of the internship, a NCP as the projects of both the control and experimental groups were handed to the instructor and corrected. In this study based on a check-list, 2 points for assessment, 2 points for ND, 1.5 points for nursing goals, 4.5 points for nursing interventions, 5 points for implementation, and 5 points for evaluation were given. Since the students had to be available in the ward two days a week, they could not complete the implementation and evaluation phases of the designed NCP, thus, the grades related to those phases were removed from the final analysis. Data analysis was performed using SPSS v.21, with a significance level of 0.05.

Statistical Analysis

Data were analyzed using SPSS software version 23. To compare qualitative variables, the chi-square test was used. $P< 0.05$ were considered significant.

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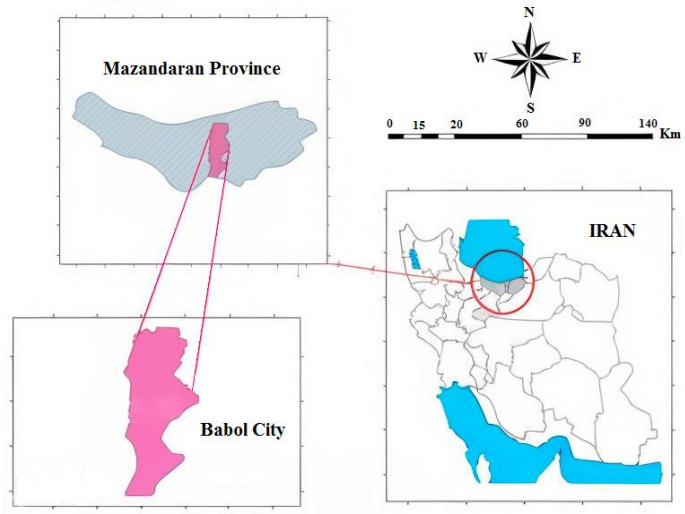

Figure 1: Map of Babol City, Mazandaran Province, Iran

Results

According to information extracted from the Babol County Health Center, 66197 people were infected with pediculosis from 2016 to 2022. The prevalence of pediculosis declined from 2016 to 2021 but saw an increase in 2022 (Fig 2). During this study, the incidence of head lice was 97.842%, body lice 2.152%, and pubic lice 0.006% (Fig 3). As shown in Table 1, the prevalence of pediculosis in Babol City was different between men and women, and the prevalence of pediculosis disease was higher in women (81.63%) than in men (18.36%). In this study, in terms of place of residence, the rate of pediculosis in villages was higher than in cities, so pediculosis in rural areas was almost 2.3 times that of urban areas (Table 1). The highest prevalence of disease was seen in children between the ages of 6–12 years (29110 n) while the lowest prevalence was seen in children < 6 years old (9617 n) (Fig 4). The general prevalence of lice infestation was 36.73%, 20.47%, 21.92% and 20.86% in autumn, winter, summer and spring, respectively. The highest number of pediculosis cases detected was related in October (13.34%), and the lowest number was related in March (4.97%). The results of the study showed that the most commonly used treatment was permethrin shampoo and dimethicone lotion.

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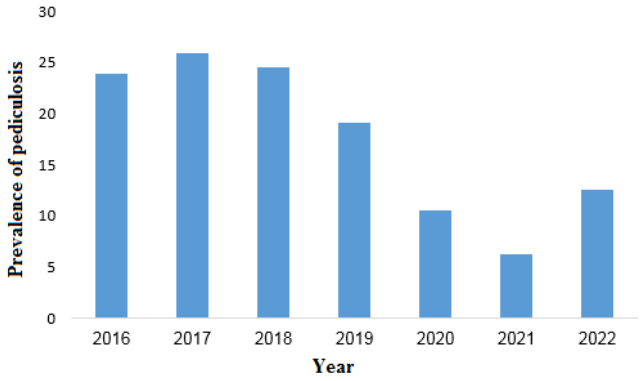

Figure 2: Prevalence of pediculosis in Babol city from 2016-2022

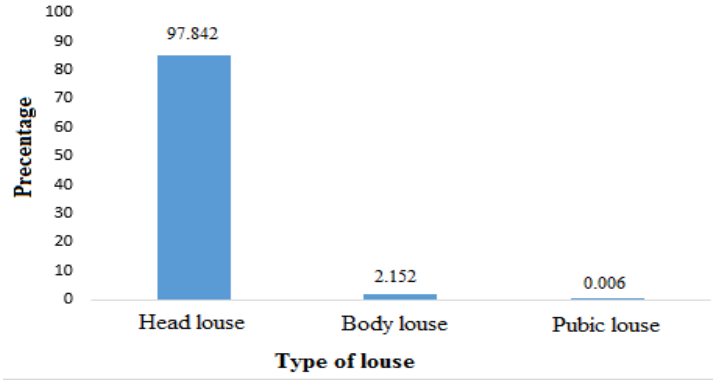

Figure 3: Percentage of pediculosis cases by type of pediculosis in Babol city

Table 1: prevalence of pediculosis according to gender and residence Percentage

Year	Gender		Residence	
	Female	Male	Urban	Rural
2016	81.30%	18.70%	34.39%	65.61%
2017	83.06%	16.94%	26.92%	73.08%
2018	79.73%	20.27%	30.70%	69.30%
2019	83.42%	16.58%	30.90%	69.10%
2020	81.56%	18.44%	32.32%	67.68%
2021	78.82%	21.18%	26.24%	73.76%
2022	81.84%	18.16%	26.71%	73.29%
Total	81.64%	18.36%	30.14%	69.85%

Discussion

In spite of advances in hygiene and sanitation worldwide, cases of pediculosis persist in both developed and developing countries. This infestation is increasingly overlooked in many parts of the world, particularly in developing nations (34). Epidemiologic research has revealed pediculosis prevalence rates of 6.8%, 23.32%, and 26.4% in Turkey (35), Thailand (36), and Nigeria (37), respectively. Moreover, studies have shown a wide range of pediculosis

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prevalence, varying from 1.6% to 67% in different regions of Iran (38). According to the results obtained in this study, it was shown that the prevalence of pediculosis has a downward trend from 2016 to 2022. The decrease in head lice during these years can be attributed to educating children and families about health habits, such as not sharing combs, brushes, and hats, along with early diagnosis and treatment, as well as improved access to healthcare. In March 2020, the World Health Organization (WHO) declared the COVID-19 outbreak a global pandemic. COVID-19 is caused by SARS-CoV-2, a coronavirus variant that leads to lung, intestinal, cardiac, and neurological damage and first emerged in China (39). As a preventive measure, the Iranian government imposed a strict and indefinite lockdown. This mandated social distancing, prohibiting direct contact between individuals from different households and requiring the isolation of symptomatic individuals, as well as imposing restrictions on leaving the house except for essential purposes. These restriction rules forced the students, as the most vulnerable ones for pediculosis, to stay at home and have virtual education. Similar lockdown measures in other countries like Argentina (Buenos Aires), the United Kingdom, and the European Union seem to have impacted transmission as well, resulting in reduced head lice transmission among school children during the COVID-19 pandemic due to school closures and the practice of social distancing (40-42).

During this study, the prevalence of head lice was 97.842%, body lice 2.152%, and pubic lice 0.006%. Head louse infestation has historically been and is likely to remain a worldwide problem because head lice can infest people of all ages, and various social and economic statuses (43). Body lice are predominantly prevalent in homeless people, refugees and living in crowded and/ or unsanitary conditions (44). They are transmitted among humans via close body-to-body contact and multiply when cold, promiscuity, lack of hygiene, and war are present. Its prevalence also reflects the socioeconomic level of society (45). prevalence of pediculosis capitis was reported as 95.7% in Ethiopia (46), 42.7% in Argentina (47), 23.38 in Iran (48) and 23.32% in Bangkok (36).

In this study, there was a significant relationship between head lice infestation and the gender of the patients. The contamination rate in women was approximately 4.44 times higher than in men, which was similar to the results of the studies of Gholami et al. (2024) (9), Sepehri et al. (2022) (49), Saraswat et al. (2020) (30), and Lessafft et al. (2013) (50). Behavioral factors such as longer hair length, greater hair density and more hair covering with scarves cause early detection and higher prevalence of parasites in women (51).

The results showed that in terms of place of residence, the rate of pediculosis in villages was higher than in cities. The reason for this difference in prevalence in urban and rural areas is the difference in the level of awareness of

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families, access to medicine and treatment, lack of access to bathrooms, and economic status. Based on a cross-sectional study in Jordan in 2012, infestation was significantly related to living in a village (31.2% in rural areas vs. 23.5% in urban areas) (52).

The highest prevalence of disease was seen in children between the ages of 6–12 years (29110 n) while the lowest prevalence was seen in children < 6 years old (9617 n). More infection with pediculosis in the age group of 6 to 12 years is due to more presence in crowded centers such as schools and the tendency of children to do personal things and leave them to their parents, and on the other hand, not having enough ability of children to do hygiene and bathing, and probably The presence of less pollution in the age group under 6 years old is due to more parental care and spending more time at home. A study conducted in Mazandaran Province, Iran from 2012 to 2020 reported similar findings (53).

The general prevalence of lice infestation was 36.73% in autumn, 20.47% in winter, 21.92% in summer and 20.86% in spring. The highest number of pediculosis cases detected was related to October (13.34%) and the lowest number was related to March (4.97%). In autumn and October due to the reopening of schools and the increase in pediculosis by students and the transmission of infection to the family, this disease increases (22). In the cold season, high rainfall provides a good condition for the growth of lice. In addition, children wear hot clothes and woolen hats in cold weather they tend to share these clothes with their siblings and peers or leave them in the schoolroom (54). Zioddini et al. (2019) reported that in the cold season (especially autumn), students are more affected by head lice than in spring (38), which was similar to the results of the study, while a study on students, aged 6-12 year in Egypt, reported a high prevalence of pediculosis capitis in the warm season (summer) and humid climate (55).

The results of the study showed that the most statistics of drugs used were permethrin shampoo and dimethicone lotion. Permethrin shampoo and dimethicone lotion are used due to their effectiveness and elimination of lice and their eggs, low risk and usability for most people, including children, availability and recommendation of CDC personnel, and affordability (56, 57). Stough et al.(2009) in the USA showed that 42.9% of permethrin-treated participants were head lice-free (58). In a similar study, Moemen bellah-Fard et al. (2016) observed that the head lice infestation treatment success using permethrin shampoo on days 2, 6, 9, and 14 were 71.8%, 64.1%, 89.7%, and 89.7%, respectively (59).

Conclusion

Lice infestation is a major public health problem. The results show that age, gender and place of residence are important variables in prevalence are pediculosis. Educating people about identifying the growth stages of head lice (nits, nymphs and adults) and methods of preventing and treating parasites and observing

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personal hygiene, especially in children, can significantly affect the prevalence of pediculosis.

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Author's contribution:

Conceptualization: AA, SMM; Methodology: AA, SMM; Statistical analysis and investigation: MM, ZGh; Writing - original draft preparation: ZGh, AA, MM; Writing – review and editing: AA, SMM.

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Disclosure statement

The authors declared no conflict of interest.

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