

## Epidemiology situation of Tinea capitis among prepubertal children in the Bagdad Al- karkh in 2024

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### Abstract

Tinea capitis represents a typical dermatophyte infection of scalp and follicles that mainly affects young children before puberty. The infection develops from fungi including Microsporum and Trichophyton species which transmit through human contact as well as contact between animals and people and from environmental sources. The researchers sought to evaluate Tinea capitis epidemiological aspects among prepubertal children in Baghdad Al-Karkh district during 2024 while studying both prevalence frequencies and exposure elements and population distribution patterns. The retrospective descriptive study analyzed the data from 309 Tinea capitis diagnosed children in the period October through December of 2024. The study data originated from dermatology outpatient facilities together with primary healthcare institutions across Baghdad Al-Karkh. Research variables included patient age and gender together with occupational background of parents and their exposure history to the infection and their showing clinical manifestations. Statistical evaluation was carried out through SPSS version 22 while maintaining a p value smaller than 0.05 for significance. Among the children diagnosed with Tinea capitis males accounted for 67% of cases while females represented 33%. The sixty-eight percent of Tinea capitis cases occurred within the age bracket of 5–8 years. Children in financial unstable families together with those who had direct exposure to infected people or animals showed higher infection rates. Most patients exhibited pruritus symptoms at a rate of 87% along with hair loss at 86% and lymphadenopathy at 71%. The public health problem of Tinea capitis continues to affect prepubertal children in Baghdad Al-Karkh. The effective control of Tinea capitis demands proper public health measures along with improved hygienic practices while implementing early antifungal treatment modalities.

**Keywords:** Tinea capitis, Dermatophytosis, Children, Baghdad Al-Karkh, Epidemiology

### دراسة وبائية لمرض سعفة الرأس بين الأطفال قبل سن البلوغ في محافظة بغداد الكرخ عام 2024

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### المستخلص

تعد سعفة الرأس عدوى فطرية شائعة تصيب فروة الرأس وبصيلات الشعر، وتنتشر بشكل رئيسي بين الأطفال قبل سن البلوغ. تنجم هذه العدوى عن فطريات مثل ميكروسبوروم وتريكوفايتون، ويمكن أن تنتقل عبر الاتصال المباشر بين البشر أو من الحيوانات إلى البشر أو من البيئة. هدفت هذه الدراسة إلى تقييم وبائيات سعفة الرأس بين الأطفال قبل سن البلوغ في مناطق بغداد الكرخ لعام 2024، مع التركيز على معدل الانتشار، عوامل الخطورة، والتوزيع الديموغرافي. تم إجراء دراسة وصفية استيعابية شملت 309 طفلاً تم تشخيصهم بسعفة الرأس بين أكتوبر وديسمبر 2024. تم جمع البيانات من العيادات الجلدية والمراكز الصحية الأولية، حيث تم تحليل متغيرات مثل العمر، الجنس، مهنة الوالدين، تاريخ التعرض للعدوى، والأعراض السريرية. أجري التحليل الإحصائي باستخدام برنامج SPSS الإصدار 22، مع تحديد الدلالة الإحصائية عند (p<0.05).

كان انتشار سعفة الرأس أعلى بين الذكور (67%) مقارنة بالإناث (33%). الفئة العمرية الأكثر تأثراً كانت 5-8 سنوات (48%). كانت العدوى أكثر شيوعاً بين الأطفال من العائلات منخفضة الدخل والذين لديهم تاريخ من الاتصال بأفراد أو حيوانات مصابة. أكثر الأعراض السريرية شيوعاً كانت الحكة (87%)، تساقط الشعر (86%)،

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### معلومات البحث

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وتضخم العقد اللمفاوية (71%). لا تزال سعة الرأس تمثل تحديًا صحيًا عامًا بين الأطفال قبل سن البلوغ في بغداد الكرخ. يعد تحسين الممارسات الصحية والتدخلات الوقائية والعلاج المبكر بمضادات الفطريات ضروريًا للحد من انتشار العدوى.

**الكلمات المفتاحية:** سعة الرأس، الفطريات الجلدية، الأطفال، بغداد الكرخ، الوبائيات

## Introduction

The scalp and hair follicles get infected by *Tinea capitis* because of dermatophyte fungi *Microsporum* and *Trichophyton* [1]. Any individual within any age group may develop this infection which medical professionals call ringworm or herpes tonsurans [2]. The microorganisms enter through the outer root sheath of hair follicles before spreading to some extent through hair shafts resulting in different patterns of clinical presentation. *Tinea capitis* exists mostly as inflammatory disease types and non-inflammatory disease types. The inflammatory variant of fungal infection produces kerion which includes painful nodule formation with pus before causing scarring alopecia but the non-inflammatory form typically does not result in permanent hair loss [3]. The pathogen can spread into additional hairy regions which include the eyelashes and eyebrows [4].

*Tinea capitis* prevalence around the world depends on geographical conditions and climate and social economic status of communities. *Tinea capitis* occurs often in locations with warm and humid conditions across Africa and Southeast Asia while it prevails throughout Central America [5]. The distribution of dermatophyte infections depends on species type because *Trichophyton* exists in equal numbers between boys and girls during childhood years yet *Microsporum canis* primarily infects male subjects [6]. During the previous four decades researchers have observed major epidemiological changes especially inside developed nations because public health measures and antifungal medications have decreased its

occurrence. The infection continues to exist as an endemic health problem in specified areas while outbreaks occur when people move between regions combined with environmental adjustments and advancing healthcare systems [7].

The most frequently observed transmission pattern is anthropophilic transmission which describes disease spread between people. Medical experts state that persistent non-inflammatory lesions often occur within these transmission cases [8]. Zoophilic transmission of infections between humans and animals leads to strong inflammatory reactions in infected body tissue. Dermatophytes that reside in soil environments can infrequently spread infections to human patients [9]. Different regions have distinct *Tinea capitis* patterns resulting from the way dermatophyte species distribute themselves and how they transmit through geographic regions.

The management of *Tinea capitis* becomes difficult due to its high number of asymptomatic patients who also spread the infection through fomites. Infected patients maintain spore shedding that produces long-term environmental contamination which sustains disease transmission [10]. *Tinea capitis* transmission through fomites is commonly associated with combs and other items like towels, hats, clothing, hair clippers and bedding according to [11]. Multiple elements including unhygienic behaviors, insufficient living space, financial struggles and communal housing arrangements function as key causes behind the continuous transmission of infections [12].

The availability of effective antifungal treatments does not resolve the Tinea capitis status as a substantial public health matter because people tend to experience recurring infections. Failures in following prescribed medications stand as the primary reason for both repeatedly occurring infections and persistent infections [13]. The majority of people have good outcomes when they start antifungal treatment early but untreated fungal infections could cause kerions and second bacterial infections[14].

Tinea capitis constitutes one of many fungal infections which place substantial health challenges on worldwide populations through their impact on more than one billion individuals yearly. The number of fungal disease-related fatalities has shown an uptrend according to data from 2017 to 2020 because deaths increased from 1.6 million to 1.7 million [2]. Tinea capitis produces substantial effects on children because this infection affects substantial numbers of children across many global regions. Data indicates that rare fungal diseases returned to affect different worldwide regions including Afro-Caribbean children in urban areas of the United Kingdom [15].

Investigating Tinea capitis prevalence along with risk factors within particular groups becomes crucial because of its extensive public health impact. The research examines Tinea capitis occurrences together with related factors in Baghdad Al-Karkh school children during 2024. Targeted interventions need development to prevent infection spread and enhance treatment results after identifying relevant factors.

### Materials and methods

This descriptive retrospective study included 309 patients diagnosed with Tinea capitis who presented to dermatology outpatient clinics in

hospitals or primary healthcare centers over the (October, November, December) in 2024. Data collection was conducted using a structured form prepared by the field epidemiology training program (FETP) section. The collected information included patient demographics (name, age, sex, address, parental occupation), family history of contact with infected individuals or animals (sheep, cats, dogs, etc.), clinical signs (erythema, pustules, alopecia, fluctuation, lymphadenopathy, hair loss), and results of microscopic examinations.

### Study Area and Population

The study population comprised primary school students aged 1–13 years. The study area was divided into two regions:

- Central Baghdad: Including health districts of Al-Karkh, Al-Adeel, Al-Kadhimiya, Al-Ameel, Al-Eelam, Al-Dora, and Sama Al-Kadhimiya.
- Surrounding Baghdad: Including health districts of Al-Mahmoudiya, Al-Rasheed, Al-Taji, Abu Ghraib, and Al-Tarmiya.

Baghdad has a total of 1,500 primary schools, 272 kindergartens, and 137 other educational institutions, making a total of 1,959 institutions. The total student population is 688,883, with 31,324 young boys and 2,439 infants.

### Data Analysis

Descriptive data analysis was performed using Microsoft Excel and transferred to Statistical Package for Social Sciences (SPSS) version 22 for further statistical analysis. Binary logistic regression was used to identify factors associated with Tinea capitis, with the strength of association assessed using adjusted odds ratios (AOR) with a 95% confidence interval (CI). Statistical

significance was determined at  $p \leq 0.05$ . Categorical variables were summarized using frequencies and percentages. Associations between fungal presence and demographic characteristics were visualized using bar graphs. Data analysis was performed using SPSS (Version 26), with  $p \leq 0.05$  considered statistically significant.

## Results

Total reported cases of tinea capitis (307) during

the period October, November and September in 2024, distributed in two parts 1st part is the center of the Bagdad were (165: 54%) cases 2nd surrounding Baghdad were (142:46%) cases as shown in figure (1) these cases reported from difference educational levels ( kindergartens ( 5 ) cases, primary school ( 144 ) case and intermediate ( 6 ) cases

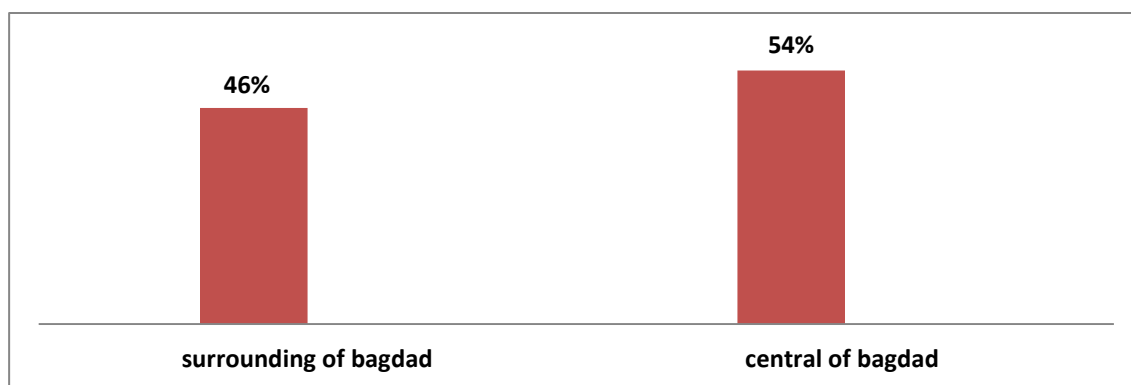


Figure (1) distribution of cases according to health districts

Distribution according to sex revealed that most of infected cases are boys (67%) more than girls

(33%) as shown in figure (2).

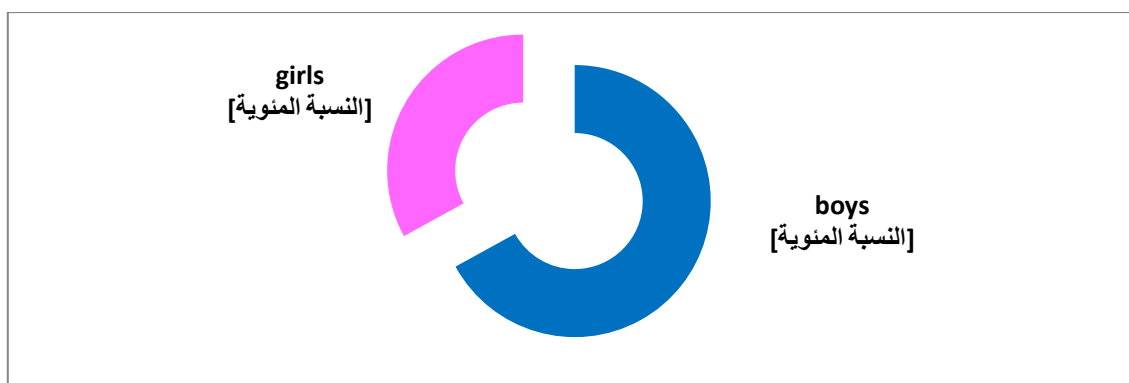
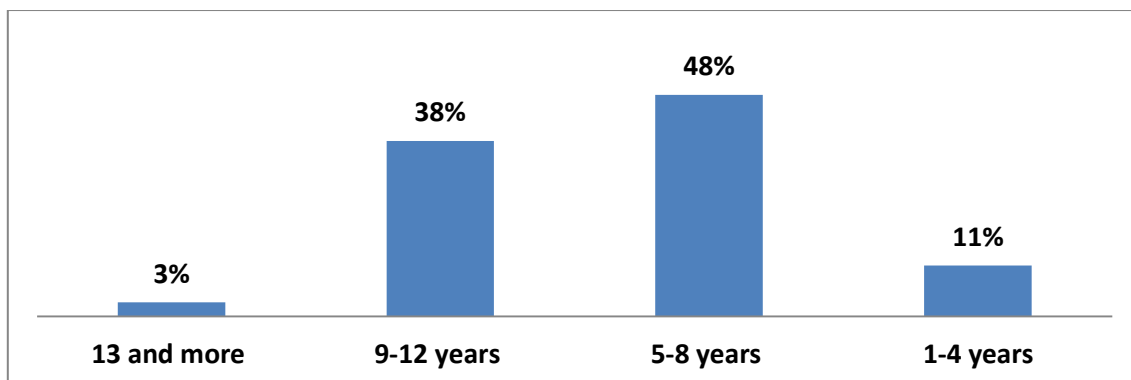


Figure (2) distribution of the cases according to sex

regarding the age groups of infected cases as shown in figure (3) that the most of infected cases at age group (5-8 years: 48%) then age group (9-12

years: 38%) then age group (1-4 year: 11%) lastly age group (13 and more years:3%).



**Figure (3) cases according to age groups**

When divided the age groups into (boys and girls) noticed that the largest group is (5-8 years :48% ) which included the boys (90 case ) more than girls

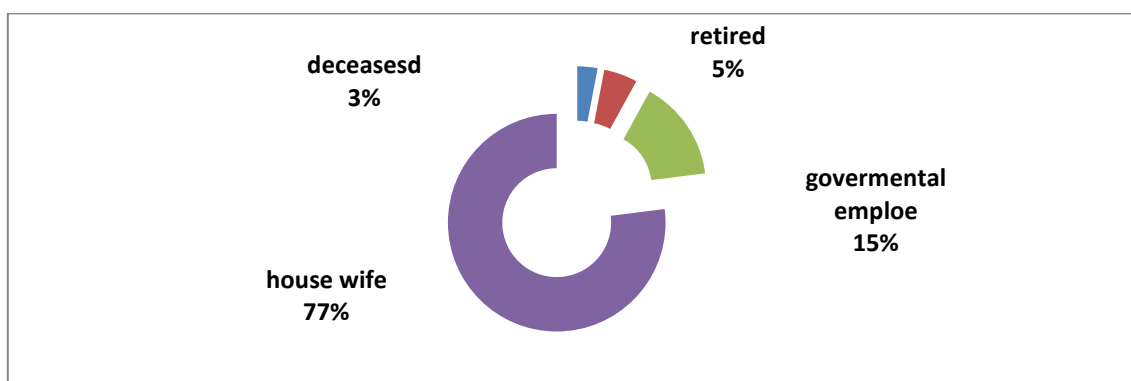
( 57 case) the smallest group is (13 and up :3%) boys 6 case more than girls (4 case) as in table (1).

**Table (1) illustrated the infected cases according to the age groups and each group according to sex**

| age groups   | Boys       | Girls      | total      | %          |
|--------------|------------|------------|------------|------------|
| 1-4 years    | 22         | 12         | 34         | 11%        |
| 5-8 years    | 90         | 57         | 147        | 48%        |
| 9-12 years   | 87         | 29         | 116        | 38%        |
| 13 and more  | 6          | 4          | 10         | 3%         |
| <b>Total</b> | <b>205</b> | <b>102</b> | <b>307</b> | <b>100</b> |

Regarding the occupation of parents we notice that (55%) of fathers are governmental Empleo, the (32%) self-Empleo then deceased (10%), retired (3%) revealed in Figure (4). While the Figure (5)

shown the occupation of mothers mainly house wife (77%), governmental Empleo, (15%) self-Empleo then retired (5%) and deceased (3%).



**Figure (5) Mothers occupation**

The most prominent sign and symptoms is pruritus (10%) scaly lesion figure (6). (87%), loss of hair (86%), adenitis 71% and,

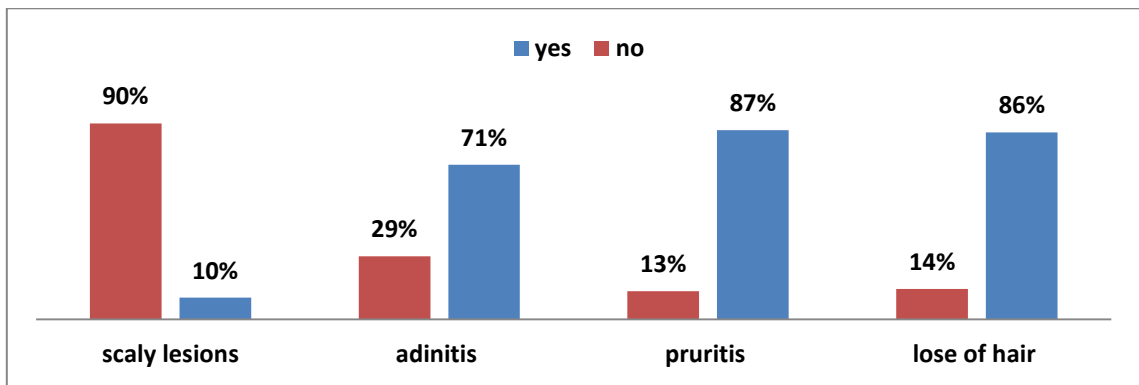


Figure (6) signs and symptoms of tinea capitis

Other risk factor if there is history of contact with the infected cases is about (28%) and (36%) have history of contact with the animals as in figure (7).

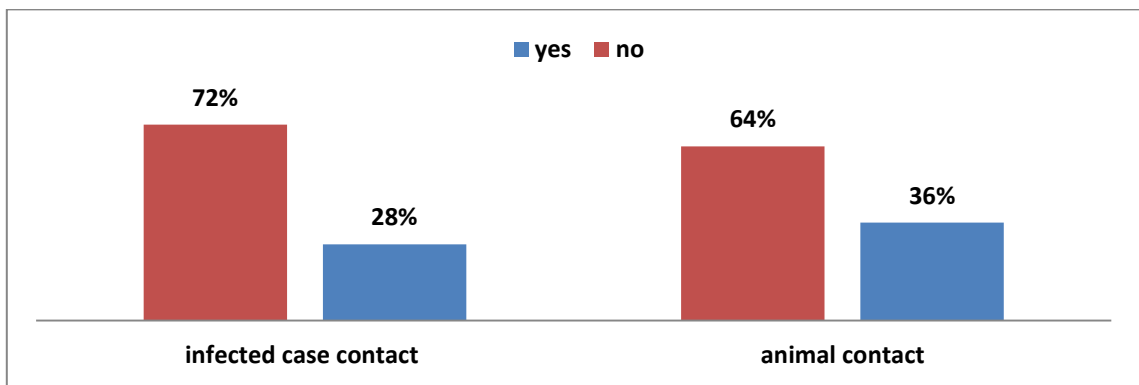


Figure (7) contact cases with either animal or infected case

Figure (8) shown the Intrafamily history of infection was present in (42%) and the rest (58%) contact with students or out family.

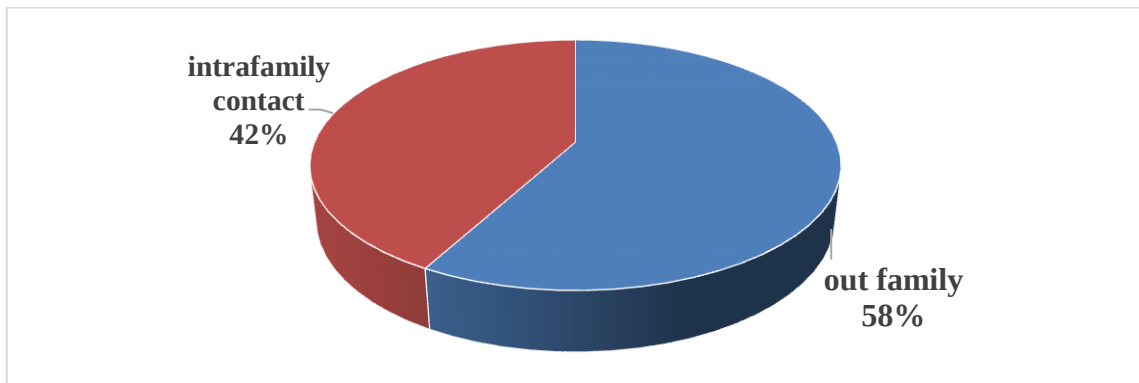


Figure (8) % contact of cases out or intrafamily

## Discussion

This study was conducted between October and December 2024 to assess the prevalence of scalp infections, specifically *Tinea capitis* (TC), in Baghdad Al-Karkh. A total of 309 patients attended outpatient clinics in hospitals and primary healthcare centers, with males (67%) being more affected than females (33%). The majority of cases (48%) were found in children aged 5–12 years, while only 3% were aged 13 years or older. Among these, 302 patients were clinically diagnosed based on dermatological examination, and seven cases required confirmation using potassium hydroxide (KOH) testing.

Our findings align with previous studies reported that males (62%) were more frequently affected than females (38%) in Baghdad [16]. Similarly, found that males had a higher incidence of TC than females in their study on 325 patients in Kuwait [17]. Broker et al. also observed that males were three times more likely to develop TC than females [18]. Attributed this disparity to societal factors, where females receive more care and attention than males, who are more likely to interact with soil, pets, and domestic animals, increasing their exposure to geophilic dermatophytes [19]. Further explained that prepubertal males have lower levels of fungistatic fatty acids, making them more susceptible [20]. Other studies, such as that suggest that poor hygiene practices during early childhood contribute to the increased incidence of TC in younger children [21].

In our study, all recorded TC cases were found among children in public schools, with no cases reported from private schools. This may be due to higher socioeconomic status and stricter hygiene control in private schools [22]. This aligns with findings from previous studies that emphasize the

role of economic and hygiene factors in TC prevalence.

The geographical distribution of cases was also analyzed, showing that 54% of cases occurred in central health districts (rural areas) and 46% in urban areas. These results are consistent with study reported a higher prevalence of TC in rural areas (53.3%) compared to urban areas (46.7%) in Tikrit [23]. Additionally, found that 14 out of 16 TC patients resided outside the city, further reinforcing the association between infection prevalence, poor hygiene, and low economic status.[24]

Regarding age distribution, TC was most prevalent in the 5–8-year age group (48%), followed by 9–12 years (38%), 1–4 years (11%), and 13 years and older (3%). These findings are consistent with Sudad et al., who reported a higher infection rate in children under 10 years [16]. Similarly, Hennessee et al. found that TC commonly affects children aged 3–7 years [25]. However, other study suggested that 3–11% of TC cases worldwide occur in adults [26]. Interestingly, studies found that postmenopausal women may be more susceptible to TC due to decreased sebum production caused by reduced estrogen levels [27,28]

Further analysis indicated that the likelihood of fungal infection was highest in the 6–9 and 10–13 age groups, with prevalence rates of 87% and 95%, respectively [29]. However, our study found a lower infection rate (3%) in individuals over 13 years, which aligns with study suggested that younger children are more vulnerable due to malnutrition and lack of self-care [30] [31]. The role of hormonal factors in limiting dermatophyte growth in older individuals [32]. also others noted that TC is rare in the elderly and often misdiagnosed due to atypical clinical presentations [33].

Parental occupation was identified as a significant risk factor. Approximately half of the fathers in our study lacked permanent salaries, and 85% of mothers were unemployed. This aligns with study found that children from families with unstable incomes had a higher prevalence of TC [18]. children from low socioeconomic backgrounds, particularly those in crowded living conditions, are more prone to dermatophyte infections due to close contact with soil, livestock, and pets.[20]

The most common clinical symptoms observed were pruritus, hair loss, and adenitis (70–90%), with 10% of cases presenting with scaly lesions. In other hand, the short hair facilitated fungal infection, making TC more common in males [34]. Other study reported that all TC patients in their study had visited a barber shop within two weeks before infection onset, emphasizing the role of barbershops in disease transmission [35]. A study in Mali found dermatophytes in 73.2% of samples collected from hairdressing tools, suggesting that salons are key infection sources.[22]

A history of contact with infected animals (36%) or infected individuals (28%) was another major risk factor. The proximity to animals increased TC risk, particularly with cats, dogs, and cattle [36]. Liang et al. reported that 19.3% of TC cases in China had a history of animal contact [35]. A study in Buchi Compound revealed that children with infected family members were twelve times more likely to develop TC.[18]

Crowded living conditions and poor hygiene also contribute to TC transmission. Other studies found that group housing, contact sports, and shared facilities (e.g., swimming pools) increased dermatophyte exposure [37]. The household crowding and low socioeconomic status were key risk factors [38]. However, another study found that only 7 out of 63 TC patients had a family

history of the infection, suggesting that animal contact may be a more significant transmission route [39]. While the study highlighted that anthropophilic fungi spread between family members through shared objects, while zoophilic fungi can be transmitted via direct contact with animals or contaminated materials [40].

In conclusion, TC remains a significant public health concern, particularly in children from low-income backgrounds and rural areas [41].

### Conclusion:

Tinea capitis remains a significant public health concern, particularly among prepubertal children in Baghdad Al-Karkh. This study highlights a higher prevalence among males (67%) compared to females (33%), with the most affected age group being 5–8 years (48%). Key risk factors identified include contact with infected individuals or animals, low socioeconomic status, and poor hygiene practices. The most common clinical symptoms observed were pruritus (87%), hair loss (86%), and lymphadenopathy (71%), indicating the need for early diagnosis and prompt antifungal treatment.

These discovery results emphasize why public health authorities need specific intervention programs to decrease the spread of Tinea capitis. The effectiveness of antifungal therapies does not prevent recurrence mainly because patients fail to follow treatment properly and remain exposed to infection sources. Decreasing Tinea capitis infections requires adequate hygiene measures combined with community education and school health provisions.

### Recommendations:

1. Early Detection and Treatment:  
Dermatological screenings should become

regular procedures in both schools and primary healthcare centers so early cases can receive identification. The healthcare system should provide cost-effective or inexpensive antifungal treatments for poor children along with treatment compliance programs. 2. Public Awareness and Hygiene Promotion: The population of parents alongside their students at school and caregivers should understand the personal hygiene significance while learning about shared hair care items' safety risks with educational public campaigns. The identification of Tinea capitis symptoms in schools and healthcare settings should be taught to both staff members and medical staff who should then expedite suspected case referrals.

2. School and Community-Based Interventions: The establishment of health programs within schools should perform periodic scalp assessments and teach hygiene practices. Schools should establish policies for hygiene through measures that stop personal item sharing and require regular material cleanings in classrooms. The provision of disinfectant solutions should extend to barbershops as well as schools and public facilities for controlling fomite transmission.
3. Animal and Environmental Control: The public should maintain responsible pet custody with veterinary check-ups and antifungal treatments for house pets. Community members should learn about direct contact dangers with stray animals since these animals function as reservoirs for fungal infections.
4. Policy and Healthcare System Strengthening: The government should create standard operating procedures to detect Tinea capitis among young students in educational settings.

New systems for monitoring dermatophytosis outbreaks should be established with quick intervention protocols for affected regions. The healthcare system must enhance access to treatment in rural regions and poor areas in order to decrease differences between infection levels and therapy results across population groups.

5. Further Research and Surveillance: Researchers should perform follow-up investigations that study population statistics and evaluate prevention programs. The investigation of both genetic factors and environmental elements which affect Tinea capitis resistance and susceptibility rates needs study. Different treatment options should be evaluated for their capacity to minimize cases of recurrence through antifungal combination therapies.

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