Prevalence of Tinea Capitis, Mycotic infection among Primary School Children in Erbil city

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Abstract
Tinea capitis is a worldwide public health problem that generates specific therapeutic challenges. Tinea capitis is dermatophytosis or ringworm of the scalp and hair. Tinea capitis is the most common superficial mycosis in school children, in developed and undeveloped regions. To the best of our knowledge there is currently no review on prevalence of Tinea capitis in study area, so this study was undertaken to determine the prevalence and intensity of Tineacapitis as well as identify the causative fungal agents of dermatophyte infection among five primary school childrens scattered in three quarters in Erbil city (Zanko1, Zanko 2 and new Zanko village. The study population composed of (180) school children aged (6-13) years who had important clinical signs of scalp dermatophytosis. Out of this number (68.33%) were males, while (31.7%) were femels. Tinea capitis infection was higher in age group(8-9) years and lower in age group(11-12)years.Cultures of hair samples were done, then macroscopical and microscopical examination were performed for dermatophyte isolates, direct microscopy and culture was positive in(78.33%) and(6.66%) of the cases were positive in direct microscopy and negative culture. The invasion of hair was Ectothrix type, forming masses of arthroconidia on the outside of the hair shaft in 117 (76.47%) specimens, while the invasion of hair was Endothrix type, and abundant sporulation inside the hair shaft causes breakage of the hair near the surface of the scalp in 36 (23.52%)
Introduction

Tinea capitis (scalp dermatophytosis) is a highly contagious infection with worldwide distribution (Mikaieili, 2019) usually caused by members of genera Microsporum and Trichophyton.

Scalp dermatophytosis is the most common of all mycoses in children and is regarded as an important public health problem in children globally, also has been reported as the most frequent skin infection affecting primary school children (EL.Said, 2001). Tinea capitis (tinea means:” ringworm” caps means head or scalp). (Weitzmanand Summerbell, 1995). Easily spreads among sibilings and family members by direct contact from other people (anthropophilic organisms), animals (zoophilic organisms) and soil (geophilic organisms). It can also be promoted by sharing of contaminated hats, combs, hair brushes, pillows, playing with domestic animals and other inanimate objects, overcrowding, poor personal hygiene (Khlfia, 2011). Both the skin surface and hairs are involved, infection of hair may be Ectothrix or Endothrix (Kadhum, 2015).

The most important consequence of this infection is permanent hair loss, especially in untreated cases, as a result of delay in treatment, inappropriate treatment (Woldemauel, 2055). Regardless of great advances in preventing and treating the disease tinea capitis is still a public health problem in the world, and important that in some studies it is concluded that any scalp lesion should be regarded as tinea capitis unless otherwise

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 comentarios. Predominant isolates in the study were T. mentagrophytes (34.52%) and Microsporum spacies (26.19%), Candida albicans and other Candida species were also isolated from five school childrens.
proven through direct examination and culture tests (Zarrin, 2011). Tinea capitismore frequent in males than female and most common between 6-10 years of age (Hainer, 2003). The non-dermatophytes fungal species that were implicated in the study include Candida albicans other Candida species (Ameneh, 2010). This study therefore investigate the prevalence, intensity and causative fungal agents among five primary school children in three quarters in Erbil city (Zanko1, Zanko 2 and new Zanko village.

Materials & Methods
Screening for Tinea capitis among sample population
Primary school children of ages 6 -12 years were screened randomly, during March – June, 2017 (wet months) for fungal infections consistent with dermatophytosis on the skin of the scalp from five selected primary schools scattered in three quarters in Erbil city (Zanko1, Zanko 2 and new Zanko village). Total of 180 students (123 male and 57 females) the age ranged from six year to twelve years. That showed visible clinical signs of scalp fungal infection are selected and studied.

1- Sample Collection:
Specimens were collected according to (Weitzman and Summerbell, 1995). Dull or short broken hairs from the scalp were plucked with sterile forceps after cleaning of area with alcohol, epilating hair from follicle is better than cutting, since the high amount of spores is seen in the root. Scraping made with scalp then collected into sterile envelops which were labeled consequently and transferred to the laboratory accompanied by questionnaire involving name of the patient, age, sex, address, presence of the lesion in other body sites, duration of illness, similar infection in their family or friends in the school, previous exposure or contact with animals, history of and time elapsed from previous medications taken and date of sample collection.

A-Direct Microscopic Examination:
Broken and plucked hair ,crusts from scraping scalp lesion were placed on the clean glass slide, then a drop of 10% KOH was added, covered with cover slip and then subjected to slight heat for one minutes to aid rapid penetration and complete maceration of tissues. The slides were examined for presence of hyphae and spores around(Ectothrix) or within hair(Endothrix) by using low (X10) and high(X40) power of simple lighte microscope.

B- Culture Examination:
The other portion of each sample cultivated on Sabouraud dextrose agar (SDA) medium with cycloheximide and Chloramphenicol (250mg/L) (Kwon-Chung and Bennett, 1992). Incubated at room temperature and hold for 3-4 weeks.

C- Identification of isolated Dermatophytes.
Fungi which isolated were identified according to macroscopical and microscopical morphology of the isolates(Kwon-Chung and Bennett, 1992).

C.1 -Macroscopical examination of the cultures: Involves number of examination rate of growth, colour, texture of the colony or consistency (Cottony, fluffy and suede-like), its surface (flat, folded and plicate) and reverse side of colony, margins and elevation from the agar surface (Clyton and Midgely, 1985).

C.2- Microscopical examination of the cultures: A small portion of fungal colony was gently teased on the slide with a drop of stain [lactophenol cotton blue] using a flamed inoculating needle. A cover slip was applied with gentle pressure then examined by low and high power (Carter and Johhn, 1990)
D-Other examination used in the study:
The isolates were also tested for their ability to produce Urease enzyme and hair perforation tests to distinguishing *Tricophyton* species. Slide culture technique was also carried out to examine the presence of macro and microconidia of *Tricophyton verrucosum*. The production of Chlamydoconidia on Cornmeal agar (Difco, UK), Germ tube test and API used for non-Dermatophytes (*Candida* species) which isolated in five cases (Kwon-Chung and Bennett, 1992).

Results
In the present study a total of (180) clinical samples were collected from suspected cases of Tinea capitis, of which 123 (68.33%) from males and 57 (31.7%) from females. The age of study group ranged from 6 to 13 years, with the maximum rate of infection falling in the 8-9 years age group (28.33%) followed by 6-7 years (23.33%). (Table 1).

<table>
<thead>
<tr>
<th>Age groups(years)</th>
<th>Male(N)</th>
<th>Female(N)</th>
<th>Total(N=) N%</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-7</td>
<td>27</td>
<td>15</td>
<td>42 (23.33)</td>
</tr>
<tr>
<td>7-8</td>
<td>16</td>
<td>12</td>
<td>28 (15.55)</td>
</tr>
<tr>
<td>8-9</td>
<td>34</td>
<td>17</td>
<td>51 (28.33)</td>
</tr>
<tr>
<td>9-10</td>
<td>21</td>
<td>8</td>
<td>29 (16.11)</td>
</tr>
<tr>
<td>10-11</td>
<td>19</td>
<td>2</td>
<td>21 (11.66)</td>
</tr>
<tr>
<td>11-12</td>
<td>6</td>
<td>3</td>
<td>9 (5)</td>
</tr>
<tr>
<td>Total</td>
<td>123 (68.33%)</td>
<td>57 (31.67%)</td>
<td>180</td>
</tr>
</tbody>
</table>

One hundred and forty one cases (78.33%) were positive in both the microscopic examination and culture, 12 cases (6.66%) were positive in microscopy but culture negative, 27 cases (15%) were negative in microscopy and positive in culture, thus the culture is more accurate than the microscopic examination in our study (Table 2).

<table>
<thead>
<tr>
<th>Test procedure</th>
<th>Number of cases</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>KOH(+ve), Culture(+ve)</td>
<td>141</td>
<td>78.33</td>
</tr>
<tr>
<td>KOH (+ve), Culture(-ve)</td>
<td>12</td>
<td>6.7</td>
</tr>
<tr>
<td>KOH (-ve), Culture(+ve)</td>
<td>27</td>
<td>15.00</td>
</tr>
<tr>
<td>Total</td>
<td>180</td>
<td>100</td>
</tr>
</tbody>
</table>

Table (1):- Age ranges and sex of school childrens with Tinea capitis

Table (2):- Correlation of direct Microscopy and Culture (N= 180)
The study also revealed that the arthroconidia which forming mases around the hair shaft (Ectothrix) found in 117(76.47%) specimens, while 36(23.52) Endothrix cases show invasion of hair shaft with arthroconidia Figure (1).

![Clinical Form Graph]

**Figure (1):** Ectothrix and Endothrix clinical form of Tinea Capitis in percentages.

**Figure (2):** Clinical appearance of Tinea Capitis among Primary School Children.

A total of 163 isolates of dermatophytes was identified by both microscopical examination and macroscopical morphology, the isolates belonged to two genera: *Tricophyton* (119 cases) the most prevalent causes of Tinea capitis in our study, accounting for 70.83% of isolates and *Microsporum species* (44 cases; 26.19%). The isolates included three species of *Tricophyton*: *T. mentogrophytes* 58 (34.52 %), *T. rubrum* 35 (20.83 %) and *T. verrucosum* 26 (15.47 %).
%), while foure Candida albicans and one Candida species were the representative non-dermatophytic isolates recorded from the study (Table 3).

Table (3):- Percentage of different dermatophytes and non-dermatophytes isolated from scalp of infected cases.

<table>
<thead>
<tr>
<th>Species</th>
<th>No. of isolates</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsporum spp.</td>
<td>44</td>
<td>26.19</td>
</tr>
<tr>
<td>Tricophyton verrucosum</td>
<td>26</td>
<td>15.47</td>
</tr>
<tr>
<td>Tricophyton mentagrophytes</td>
<td>58</td>
<td>34.52</td>
</tr>
<tr>
<td>Tricophyton rubrum</td>
<td>35</td>
<td>20.83</td>
</tr>
<tr>
<td>Candida albicans</td>
<td>4</td>
<td>2.38</td>
</tr>
<tr>
<td>Candida sp.</td>
<td>1</td>
<td>0.59</td>
</tr>
<tr>
<td>Total</td>
<td>168</td>
<td>100</td>
</tr>
</tbody>
</table>

Discussion

Tinea capitis, also known as Herpes tonsurans is a superficial fungal infection of the hair, scalp, eyebrows and eyelashes with a propensity for attacking hair shafts and follicles (Bolognia, 2007). Scalp ringworm can affect people of all ages, but this condition is more likely to affect kids under the age of 10. According to the American Academy of Dermatology (Klaus and Johnson, 2009). The infection is primarily caused by dermatophytes, belongs to genera Trichophyton and Microsporum that invade the hair shaft. The present study highlights the clinical pattern of T. capitis, its prevalence and results revealed that T. capitis is primarily a disease in young children, and this results is consistent with Woldemanuel, (2005) which recorded in his study that Tinea capitis is an important dermatological problem and health issue among children in Ethiopia (Khlifa, 2011) also reported that the majority of cases occur in younger children under 10 years of age, this has been mainly attributed to the sensitivity of dermatophytes to certain secretions of sebaceous gland secretions that first appear at puberty (Rippon, 1988), also the reason for higher prevalence of tinea infection may be linked to several factors such as host socioeconomic characteristics, over crowding in classroom, level of hygiene practice, nature of school infrastructure and amenities, climate, affinity for contact sports, contact with domestic animal and nature of health care system (Nweze, 2010; Khosravi and Mahmoudi, 2003). Our study showed that the more frequent occurrence of tinea capitis observed among male children in (Table 1) with rate 123 (68.33%), while females rate of infection 57 (31.66%) these results was near that found by (Mikaieili, 2019; Shalaby, 2016 and EL. Said, 2001). The physical engagement of male children in contact sports such as increased outdoor physical activity, wrestling, football, boxing, increasing sweating, male short hair condition (easy implantation of spore) visit the barber’s shop more subjugate that male more promotes infection than female which reported by (Ndako, 2012) while girls appear to pay more attention to their outlook, especially as they approach teenage age. As universally reported by most of workers, Tinea capitis is an infection of childhood, in the present study a total of 180
school children with Tinea capitis, The highest rate of infection occur in age group (8-9) years, as shown in table (1) similar results were reported by earlier researchers Al Shekh (2009): Sarma and Bothakur (2007), the probable reason for higher prevalence in this age group could be that the children are often most active or may be due to lack of fungistatic secretion by scalp in childhood (Nermin, 2001). The results proved that 141 (78.33) specimens were positive in both direct and culture examination, however we see that some cases shown KOH mount negative or culture negative although the children have clinical signs of Tinea capitis, this variation could be due to inadequacy in sampling due to very small lession or due to non-viability of fungal elements in some cases, or some cases treated with antifungal and non reported, this finding concurred with Shalaby, et al (2016).

The foregoing results in figure (1) showed the Ectothrix hair invasion was the prevalence type of hair infection, and this result is in agreements with the results recorded in Kadhum, et al., 2015 and Al-Hamadani, et al., 2012, while some studies have reported that Endothrix hair type to be more common (Kakourou, 2010; Afshar, 2016). This result is in harmony with the finding of (EL. Said, 2001: Azab, 2012), that Tricophyton and Microsporum were the two main dermatophytes found in Tinea capitis sample and five species of Candida isolated as non-dermatophyte recorded in our study, similarly Candida albicans has been documented in many studies (Al Shekh, 2009: Havlickova and Friedrich, 2008).

References


