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Highlights

Eco-friendly Disinfectant

Incidence of Schistosomiasis

Discovering Thoughts, Inventing Future

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Epidemiological studies on Dermatophytoses in Warangal District, Telangana State, India

By Dr. Gadangi Indira

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Abstract- The frequency of superficial fungal infections is more in hot and humid climate. Seasonal variation of skin diseases, a subject of much epidemiological interest, has been studied for centuries. The present study report is on dermatophytoses in different clinical conditions such as age, sex and seasonal impact in Warangal District, A.P. A retrospective study was done on all new outpatients visiting a single dermatologist Dr. Ramesh, at the Ramesh skin hospital, Warangal, Andhra Pradesh. The study population comprised of all new subjects visiting the outpatient department, from January to December, from 2008- 2010. The total number of cases was recorded according to the month wise prevalence.

Keywords: *dermatophytosis, tinea or ringworm infections, dermatophytes, woods lamp and skin scrapings.*

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Epidemiological studies on Dermatophytoses in Warangal District, Telangana State, India

Dr. Gadangi Indira

Abstract- The frequency of superficial fungal infections is more in hot and humid climate. Seasonal variation of skin diseases, a subject of much epidemiological interest, has been studied for centuries. The present study report is on dermatophytoses in different clinical conditions such as age, sex and seasonal impact in Warangal District, A.P. A retrospective study was done on all new outpatients visiting a single dermatologist Dr. Ramesh, at the Ramesh skin hospital, Warangal, Andhra Pradesh. The study population comprised of all new subjects visiting the outpatient department, from January to December, from 2008- 2010. The total number of cases was recorded according to the month wise prevalence. Data was obtained from the hospital outpatient records and analyzed. The total number of patients with skin diseases was 400 (Males-234 (67%); Females-166 (33%). This difference may be due to increased physical activity and more exposure to the out door activities leading to exposure to infectious dermatophytic agents. In this study, maximum number of patients was seen in the third decade in the age group of 21- 30 years with males outnumbering females. Seasonal variations have a greater impact on dermatophytoses as more number of cases was recorded in summer followed by winter. The prevalence of dermatophytic infections is governed by environmental conditions (Padhye 1970), personal hygiene (Oyeka 1992), and individual susceptibility from place to place. The prevalence of tinea infections was more in urban area with 278 cases (69.5%) than in rural with 122 cases (30.5%).

Keywords: dermatophytosis, tinea or ringworm infections, dermatophytes, woods lamp and skin scrapings.

I. INTRODUCTION

Dermatophytoses are a superficial cutaneous mycoses confined to the outer layers of skin, hair, and nails, and do not invade living tissues. The fungi are called dermatophytes. Dermatophytes, or more properly, keratinophilic fungi, produce extracellular enzymes (keratinases) that are capable of hydrolyzing keratin. These infections are commonly called as tinea infections or ringworm infections. Basing on the area or site of infections these are categorized as tinea capitis (plate-1), tinea corporis (plate-2), tinea manuum (plate-3), tinea cruris (plate-4), tinea facie (plate-5), tinea pedis (plate-6). Dermatophytes are by far the most significant fungi because of their widespread involvement of population at large and their prevalence all over the

world. They are assuming greater significance both in developed and developing countries particularly due to the advent of immunosuppressive drugs and disease. Hot and humid climate in the tropical and subtropical countries like India makes dermatophytosis a very common superficial fungal skin infection. The prevalence of dermatophytic infections are governed by environmental conditions [18], personal hygiene [17], and individual susceptibility from place to place. The isolation of different dermatophytes also varies markedly from one ecological niche to another niche depending on their primary habitat [3]. The isolation of different dermatophytes also varies markedly from one ecological niche to another niche depending on their primary habitat [3]. The Warangal district in Andhra Pradesh (India) is predominantly a rural area with tropical climate. Though the ringworm infections are more prevalent, no systemic study and analysis has been made so far. The present investigations were undertaken to identify the size and magnitude of the dermatophytoses problem in this region. Further objectives were to:

- i. study the incidence of dermatophytosis according to age and sex factors.
- ii. study the effect of seasonal variations in clinical types of dermatophytosis.
- iii. study the incidence of dermatophytoses in rural and urban areas.

II. MATERIALS AND METHODS

a) Study group

The present study was conducted in Warangal, which has favorable environment for development of superficial mycoses. The climate in the district is hot and humid for most of the year. It receives moderate to heavy rainfall in monsoon season. The present study was conducted on 400 clinically diagnosed patients with dermatophytoses who visited as out patients at Ramesh Skin Hospital (Dr. Ramesh, Dermatologist.) during the two-year period: January 2008 to December 2010. Most of the patients belong to low and middle socioeconomic groups coming from Warangal town and surrounding villages of Warangal district. The data from the patients was collected by supplying a data sheet regarding name, age, sex, address, occupation, family history, socioeconomic background, duration of illness, personal contact at home, work place /school, previous

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medication like antifungal therapy, history of using immunosuppressive drugs and involvement of more than one site. After collecting the information the patients were examined regarding the lesions, types, and presence of inflammatory margins for apparent diagnosis of infection. If the outbreak is large a random sample was examined and data was collected.

b) Sample collection

The samples from patients were collected in aseptic conditions from infected areas such as skin, nail and hair (Robinson 1988, Murray 1999).

- i. *Skin scrapings:* After disinfecting the skin by ethyl alcohol or spirit by using scalpel or blade scrapings are collected and from toe cleft the samples were collected by using epilating forceps.
- ii. *Nail clippings:* After disinfecting the nails were cut on glossy paper and in case of onychomycosis the dorsal plate was scraped.
- iii. *Hair pluckings:* By epilating forceps the hairs were plucked and a part of scalp material was scraped and stored in a glossy paper.

The samples collected from the subjects were immediately transported to the laboratory as early as possible under aseptic condition for further examinations. The following examinations were down to diagnosis and identification of species.

- i. By examination with Woods lamp (Ashwananda, 1999)
- ii. Examining the fungi by treating the scrapings with 10% KOH under microscope
- iii. By staining the histological sections with Periodic acid Schiff (Hotchkiss-McManus) if scraping and culture diagnostic techniques are negative.

- iv. Culturing of organisms from skin scraping and other samples on selective medium as Sabouraud Dextrose Agar for identification of dermatophytic species.

III. RESULTS AND DISCUSSIONS

a) Age and sex wise prevalence of dermatophytoses

The results of analysis made through sex and age wise prevalence of dermatophytosis are presented in Table 1 and Table 2. Out of the 400 patients included in this study, 234 (67%) of the patients were male and 166 (33%) were female. Male to female ratio was 2.03:1. This statistical analysis was shown in Table-1. This difference may be due to increased physical activity and more exposure to the out door activities leading to exposure to infectious etiological agents or fungi. Similar to the present observations, the study on dermatophytosis at Tirupati reported male preponderance with female ratio was 2:1. Dermatophytosis was more prevalent in men (63.4%) than in women (27). Similarly Gupta et al., (2001) have reported male preponderance with female ratio of 2.3:1. Males were affected at least 3 times more frequently than the females, according to the reports of Sentamilselviet al (1997). In most of the other studies there was a predominance of male population than females. In the present study also there was male predominance over female population. This was due to more vulnerable infections such as higher exposure to army, school activities, increased sweating and types of shoes and socks they use [20,21].

Table1 : Sex wise occurrence of dermatophytosis

	Males	Females	Total	Ratio of male/female
No. of cases	234	166	400	2.03:1
Percentage	67	33	100	

Total no. of cases = 400; Total no. of males = 234 (67%);

Total no. of females = 166 (33%)

Table 2 : Age wise occurrence of dermatophytosis

Age(years)	No. of cases	Percentage
0-10 yrs	36	9.0
11-20 yrs	78	19.5
21-30 yrs	102	25.5
31-40 yrs	78	19.5
41-50 yrs	54	13.5
51-60 yrs	28	7.0
61-70 yrs	22	5.5
71-80 yrs	02	0.5
Total	400	100

A critical analysis of Table-2, reveals that the maximum cases were seen in the age group 21 -30 (25.5%) followed by the age groups of 11-20 and 31-40 with same 78 cases each (19.5). Most of patients were in the age range of 20-29 years [27] which confirms to the results of some researches in Iran [15,1]] But in the early years 0-10 years the cases reported were less 36 (9%) than the adolescent age 11-20 with 78 cases (19.5%) as the environmental exposure and physical activities were more in this age group. In the fifth and sixth decades of life there was a gradual decrease in the incidence of disease, so 28 cases (7%) were seen in 51 60 and 22

cases (5.5%) in 61-70 years. Least incidence was reported with only 2 cases (0.5%) in 71-80 age groups due to the less survival rate at this age group. Ranganathan et al (2001). Sharma and Gupta (1983) in their investigations revealed that the maximum number of patients was in the age group of 20 – 30 (30.7%).

This increased incidence of fungal infections may be due to the hormonal change and or increase in sebum secretion [7]. The age group most commonly affected was between 20 and 40 years of age. Females were affected more between the ages of 30 to 40 years based on an Indian study report by Sentamilselviet al (1997). Similarly Verenkaret al (1991), in their study on dermatophytosis reported that ringworm infection were common in third decade of life. Gupta et al (1993) also reported high incidence of infection in the age group of 21-30 yrs. According to a study report based on the Dermatophytoses in Khammam district, Andhra Pradesh, India by Sumana and Singaracharya (2004), the prevalence of infection was more in males and infection was more common in 21-30 years of age group.

The data recorded in Table-3 was analyzed and we concluded that the incidence of dermatophytic infection was high in the age group of 21-30 yrs with males 57 cases recorded (55.8%) and females with 45 cases (44.11%) followed by the age group of 11-20 yrs with males 46 cases (58.97%) females 32 cases (45.02%) and 31- 40 yrs with males 45 cases (57.69%) females 33 cases (42. 30%). In the age group of 41- 50 yrs the males were 31 (57.40%) and females were 22 (42.59%).

Table 3 : Age and sex wise occurrence of dermatophytosis

Age group	Sex	No. of cases	Percentage	Total no. of cases	Total percentage
0-10 yrs	Male	22	61.1	36	9.0
	Female	14	38.98		
11-20 yrs	Male	46	58.97	78	19.5
	Female	32	41.02		
21-30 yrs	Male	57	55.88	102	25.5
	Female	45	44.11		
31-40 yrs	Male	45	57.69	78	19.5
	Female	33	42.30		
41-50 yrs	Male	31	57.40	54	13.5
	Female	23	42.59		
51-60 yrs	Male	18	64.28	28	7.0
	Female	10	35.71		

61-70 yrs	Male	13	59.09	22	5.5
	Female	09	40.91		
71-80 yrs	Male	02	100	02	0.5
	Female	nil	0		

The incidence of dermatophytosis gradually declined in fifth and sixth decades of life with males 18 (64.28%), females 10 (35.71%) in 51-60 yrs age group and males were 13 (51.09%) females 9 (40.91%) in 61-70 yrs age group. In the age group of 0-10 yrs male were 22 (61.1%) and females 14 (38.98%). The least incidence of infection was recorded in the age group of 71-80 yrs with only 2 (100%) cases were reported in males. In a study report by Kamothi (2010) on prevalence of dermatophyte infection in Rajkote District, young adult in age group of 21-30 years were mainly affected. Male to female ratio was 2.03:1. In this study, maximum number of patients was seen in the third decade in the age group of 21- 30 years with males outnumbering females. Similar findings have reported by other workers [19,12]. Senet al, (2005) also reported the male predominance over females, although some authors found higher incidences in the second decade of age [6].

b) Seasonal incidence of dermatophytosis

Seasonal variation of skin diseases, a subject of much epidemiological interest, has been studied for centuries. The data was collected for two years (2008-2010) and the total number of the cases were recorded according to the month wise prevalence and were analyzed according to seasons. The seasonal variations and their impact on dermatophytosis were presented in the Table -4 and the critical analysis showed the high incidence of disease in month of April (49cases, 12.25%) followed by May (43 cases, 10.75%) and June (40cases, 10%). Correlated with seasonal variations majority of our patients with fungal infections were reported to be more in summer. It is known that warm, humid climates create the environment for the development of fungal infections as the temperature, humidity, ultraviolet radiation (UVR), flora and fauna all change with season [11]. The high prevalence of dermatophytosis in June month could be attributed to the extended summer season in Warangal district of Andhra Pradesh.

Table 4 : Month –wise occurrence of dermatophytosis

Month	No. of cases*	Percentage
January	33	8.25
February	27	6.75
March	38	9.5
April	49	12.25
May	43	10.75
June	40	10
July	32	4
August	25	6.25
September	21	5.23
October	22	5.5
November	34	8.5
December	36	9

The frequency of fungal infections varies with seasons. The critical analysis of Table-5 reveals that, the highest number of cases of tineapedis and tineacuris occurred in the summer months, while tineacapitis, tineacorporis and tineanguium occurred in the spring and winter months [28]. Our findings, Table-1 and fig-1, even corroborate with the study report on dermatophytoses in Khammam district, Andhra Pradesh, India by Sumana and Singaracharya (2004). The incidence was more during the months of March to July in patients who were agricultural labourers living in rural areas.

Table 5 : Incidence of clinical types in lab investigation

Clinical types	Tinea corporis	Tinea cruris	Tinea inguinalis	Tinea pedis	Tinea capitis	Tinea manuum	Tinea faciei	Total cases
Summer (March-July)	32	43	28	48	32	16	03	202
Winter (Nov-Feb)	19	21	23	20	34	12	01	130
Rainy season (Aug-Oct)	12	14	11	10	14	07	-	68

Figure 1 : Clinical types of tinea infections

Plate-1: Tinea capitis



Plate-2: Tinea corporis



Plate-3: Tinea Mannum



Plate-4: Tinea cruris



Plate-5: Tinea facie



Plate-6: Tinea pedis



The incidence of dermatophytosis in the months of November with 34 cases and December with 36 cases can be explained, as the infections with anthropophilic species being commoner during summers while infections with zoophilic species peaking during the autumn and winter months (Jang, 2000). The higher prevalence of dermatophytoses of pets like cats and dogs, coupled with greater contact of humans with their pets during the winter months have been presumed to result in common tinea infection by zoophilic species. The higher incidence of dermatophytic infections in winter than rainy season is explained that low temperature and lower humidity results in the extensibility, resistance to fissuring and hydration of the stratum corneum, thus contributing to damage of the epidermal barrier thus causing more lesions in winter..

Studies of dermatophyte infestations. *Distribution of dermatophytosis among rural and urban population.*

The prevalence of tinea infections was more in urban area with 278 cases (69.5%) than in rural with 122 cases (30.5%) and the data was presented in Table-6. The incidence of dermatophytosis is very high among the patients of low socioeconomic status in rural population with 91.8% than in urban with 75.89%. This is due to the poor hygienic conditions and overcrowding. Even the people were infected with ringworm infections by soil (geophilic), animals (zoophilic) and contact by man (anthropophilic). In the middle income group the incidence of dermatophytosis was more in urbanites (19.42%) than the rural people (8.19%). The reasons could be attributed to the high humid conditions due to concrete buildings and overcrowding of the population in urban areas.

Table 6 : Prevalence of dermatophytosis in urban and rural population

Socio economic Status	No. of cases in rural	Percentage	No. of cases in urban	Percentage
Low income	112	91.80	211	75.89
Middle income	10	8.19	54	19.42
High income	-	-	13	4.67
Total no. of cases	122	30.5	278	69.5

The prevalence of dermatophytoses in urban and rural schools was reported to be 14.3% and 10% respectively [29]. Our study report is similar with the report on extent and pattern of pediatric dermatoses in rural areas of central India by Vikas Bhatia (1989). The nutrition also has a significant role in the incidence of ringworm infections. The rural children who were lacking the sufficient diet were more prone to the tinea infections in Udaipur district [5].

Children of primary school age are usually between the ages of 3 to 14 years or above in rural areas, and thus, are more susceptible to various infections due to their close contact with each other and low immune status when compared with adults. Some other factors such as enlightenment, customs, and tradition of people, hygiene level and environmental sanitary conditions may influence the prevalence of dermatophytosis [2]. Also, their inability to keep themselves clean always, and their frequent contact with soil and infected pets like dogs and cats at home. The study was carried out to determine the prevalence of dermatophytosis among primary school children [8] at Nigeria, revealed that close contact with the soil and pets increased the incidence of dermatophytoses among the school children.

IV. CONCLUSION

The study revealed that the ringworm or tinea infections are very common in the age group of 21-30 years and less common in two extremities of the age group i.e., children and old age people. The reason for this incidence of dermatophytosis can be attributed to the increased physical activities and increased opportunity for exposure and due to the hormonal change. The male preponderance was observed in ringworm infections with male to female ratio as 2.03:1. The increased incidence in the males might be explained as increased outdoor physical activities and exposure to infectious etiological agents, as mostly they are the breadwinners of the family. Prevalence of tinea infections were observed to be more in summer season than in winter. It is known that warm, humid climates create the ideal environment for the development of fungal infections. The high prevalence of dermatophytosis in June and July months could be attributed to the extended summer season in Warangal district of Andhra Pradesh. The prevalence of tinea infections were found to be more in urban area with 278 cases (69.5%) than in rural with 122 cases (30.5%). But the incidence of dermatophytosis is very high among the patients of low socioeconomic status in rural population with 91.8%

than in urban with 75.89%. This is due to the poor hygienic conditions and over crowding. In the middle income group the incidence of dermatophytosis was more in urbanites (19.42%) than the rural people (8.19%). The reasons could be attributed to the high humid conditions due to concrete buildings and over crowding of the population in urban areas.

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Incidence of Urinary Schistosomiasis Amongst Out-of-School Pupils and “Almajiris” in Dikwa, North Eastern Nigeria

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Abstract- Urinary schistosomiasis, which is one of the commonest forms of the parasitic disease is a major debilitating disease characterized by blood in urine. The study aimed at the exploration and description of the knowledge, attitude and practice of the community members with regards to schistosomiasis in Dikwa Local Government Area of Borno State, Nigeria. A cross-sectional study of 302 school pupils and “Almajiris” 7 - 15 years was undertaken using a uniform set of structured interview schedule administered by trained field assistants. This was supported with some qualitative data collected from in-depth interview with community leaders and “Mallams”. One-third of the people interviewed were aware of the schistosomiasis. For a majority however, the perceived causes of the disease included witchcraft and sexual or body contact with infected persons.

Keywords: *urinary schistosomiasis, security challenge, “almajiris”, dikwa, nigeria.*

GJMR-C Classification : *NLMC Code: QV 243*



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Incidence of Urinary Schistosomiasis Amongst Out-of-School Pupils and “Almajiris” in Dikwa, North Eastern Nigeria

Balla, H.J^α, Babaganal^σ, Dr. Baba S^ρ & Ibrahim, H^ω

Abstract- Urinary schistosomiasis, which is one of the commonest forms of the parasitic disease is a major debilitating disease characterized by blood in urine. The study aimed at the exploration and description of the knowledge, attitude and practice of the community members with regards to schistosomiasis in Dikwa Local Government Area of Borno State, Nigeria. A cross-sectional study of 302 school pupils and “Almajiris” 7 - 15 years was undertaken using a uniform set of structured interview schedule administered by trained field assistants. This was supported with some qualitative data collected from in-depth interview with community leaders and “Mallams”. One-third of the people interviewed were aware of the schistosomiasis. For a majority however, the perceived causes of the disease included witchcraft and sexual or body contact with infected persons. The study observed a total prevalence of 48.7% among the studied subjects. 72% of the “Almajiris” were infected with urinary schistosomiasis with 92% among the age group 12 – 16 and 58% among the age group 7 – 11years. 32% of the school pupils were infected with highest (39.5%) among the age group 12 – 16 years and 26.5% among age group 7 – 11 years. Only 10.6% of the studied subjects were aware of the disease. The study observed poor knowledge of the disease even among the parents/guardians of the primary school pupils. The insurgency has a great impact in the spread of the diseases as most of the inhabitants who rarely go to the stream do so now due to lack of potable water and current security challenge in Dikwa.

Keywords: urinary schistosomiasis, security challenge, “almajiris”, dikwa, nigeria.

I. INTRODUCTION

Urinary schistosomiasis is a major debilitating disease characterized by blood in the urine. In the worst cases urinary schistosomiasis will cause bladder cancer.

An alarming 201-5 million Schistosome infections (mainly *Schistosoma haematobium*) were estimated to occur in Africa, accounting for more than

97% of the number of infections worldwide¹. Nigeria is one of the highly endemic countries where the disease has been unsystematically reported and large areas remain where the disease status is unknown. Schistosomiasis is associated with poverty and poor living conditions, inadequate sanitation, and poor water supply as well as unplanned water resource development².

Urinary schistosomiasis is endemic in Nigeria in general. The prevalence levels of urinary schistosomiasis in both rural and urban communities is within 2% and 90% and occurring more among the poor and marginalized group³.

In Borno State, urinary schistosomiasis has been reported in several communities of Nigeria (4 - 7). However, these studies were based only on school aged children with only one on the “Almajiris” 7. reported the disease amongst primary school pupils and “Almajiris” in Maiduguri, Borno State, Nigeria. Even then, there is still the need to obtain more information on schistosomiasis in this group because they constitute an appreciable number of the population in this part of Nigeria and in order to justify their inclusion in mass treatment program.

The study aimed at the exploration and description of the knowledge, attitude and practice of the community members with regards to schistosomiasis in Dikwa Local Government Area of Borno State, Nigeria.

II. MATERIALS AND METHODS

a) Study Area

The reports on prevalence studies carried out within and outside Maiduguri prompted the researchers to conduct this research in Dikwa town headquarter of Dikwa Local Government Area of Borno State. The study was carried out between April and May, 2013 so as to evaluate the peoples’ attitude, knowledge, and incidence of urinary schistosomiasis. Dikwa is located along Gamboru-Ngala road to the Eastern part of Maiduguri, 86Km away from the State head quarters. Dikwa harbours varieties of streams, ponds and lakes where the intermediate host are found. It occupies an area of about 1,663sqKm and lies on longitude 14o East and Latitude 13o North. The ethnic group comprises of;

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Kanuri, Shuwa, Gamargu, and Fulani. Major occupation is farming and trading but few are civil servants. The commonest crops grown are millet, beans and groundnut. However, the dry season farming grows rice, wheat, onion, tomatoes and pepper in commercial quantities. There is the famous Rabe's fort which serves as a tourist attraction to people within and outside the country. Dikwa is one of the LGAs affected by the insurgency hence the reason for some constraints encountered during the conduct of this research.

b) Ethical Consideration

The protocol for this study was approved by the "Mallams" (who are the guardians of the Almajiris) and the parents of the out-of-school pupils, on the agreement that infected subjects would be referred to the health centre for appropriate treatment. Informed consent was obtained from each of the participants. Information about schistosomiasis and direct contact with water bodies were obtained and recorded in the questionnaire. Subjects who responded to the questionnaires but declined sampling were excluded from the study. Infected subjects were referred to the Primary Healthcare Centre for immediate treatment.

c) Study Population

The study population comprised of subjects who were between the ages of 7-15 years. Due to the insurgency and relatively poor compliance, all the primary schools in Dikwa were closed; hence the researcher sought the assistance of ward heads to be able to sample the primary school pupils.

The study is prospective on "ALMAJIRIS" and Primary school pupils in Dikwa of Northern Borno State. A total of 500 questionnaires were administered by one of the authors who is an indigene of Dikwa with the help of staff of the Dikwa General hospital. The questionnaire was coded in English but the author interpreted to those who do not understand English. The distribution was done in such a way that it cuts across all age groups, sexes and affiliation, whether school pupil or "Almajiris". Before the start of this research, the author consulted the respective ward heads (Bulama) and "tsangayas" for the objectives of this research. A total of 302 urine samples were collected from the subjects that responded. One hundred and twenty-two (122) urine samples from the Almajiris and one hundred and eighty (180) samples from the out-of-school pupils.

The questionnaire sought to obtain name, age, previous residence, duration of stay in the present community, religion, history of anti schistosomal drug, observation of blood in urine and so on. The subjects were asked about the causative agent, evidence of awareness about the infection and relationship between infection and water contact.

The subjects were given an enlightenment lecture before sampling commenced.

The samples collected were the much that could be gotten considering circumstances around the study area. Samples were randomly collected from pupils and "Almajiris"

d) Collection of Sample

The sampling was carried out between March – May, 2013. The researcher being a native carried out an awareness lecture using the local language (Kanuri) in the various wards and "tsangayas" sampled. The subjects were given sterile urine containers and advised to produce only terminal urine. The collection was done between 10am and 2pm because it is the period that eggs of *S.haematobium* are more likely to be passed in urine. The samples collected were preserved in a solution of 10% Formol saline at the ration of 1:100. Structured questionnaire were administered to parents and Mallams for demographic information and source of drinking water.

e) Parasitological Examination

In the laboratory, the urine was first examined macroscopically for colour, presence of blood and consistency. The procedure by 10 was applied. Urine samples were transferred into centrifuge tubes and spun at 15000rpm for 5 min. Deposits was examined for the presence of parasite eggs.

f) Data Analysis

The data obtained were analyzed using Statistical Package for Social Sciences (SPSS) version 17.0 into simple percentiles and test for significance.

III. DISCUSSION

Several studies on urinary schistosomiasis had focused on school aged children and adults^{5, 6, 11-14} and so on. However, only one was carried out on the "Almajiris" who form a part of the Northern Nigerian population.

This study revealed an overall incidence of 48.7% which is higher than the study carried out on the same subjects by⁷ which revealed an overall prevalence of 30.4%. The slightly higher prevalence of this study may be attributed to the fact that this work was carried out in Dikwa a Local Government Area with lesser provision of social amenities such as potable water. Also the level of awareness of the disease in Maiduguri is higher than it is in Dikwa and consequently the subjects may not frequent the infested water.

The prevalence of 32.7% of urinary schistosomiasis among Primary school pupils is in agreement with the study by¹⁴ who reported prevalence of 32.2% in Ogun State, Balla and Jabbo who revealed prevalence of 34.2% among school aged children in the rural communities of Mayo-Belwa. However, similar studies carried out in Maiduguri revealed lower prevalence of 11% by⁶. The reason may be due to the current insurgency crisis which stops pupils from

attending schools hence having more time for swimming and possible contact with the infective cercarial larvae in water.

The 75% prevalence among the "Almajiris" is very alarming and is in agreement with the previous study by 7 which revealed prevalence of 72.9% among Almajiris in Maiduguri. This group lack parental control which makes them more likely to go out for swimming. They also lack adequate knowledge of the disease hence do not seek for treatment and this makes them reservoirs of the infection in the communities. 7 further added that children in this region are more likely to visit water body for recreation and domestic needs due to the harsh weather that persists for most part of the year. All ages studied had infections which indicate infection with schistosomiasis starts early in life.

The high prevalence observed among the age group 12 -16 agrees with the findings of 16 who reported prevalence of 65.8% among age group 10 -14 years in Quan'an - Pan Local Government Area of Plateau State. 17 also reported high prevalence of 57.4% among age group 10 -14 years in Danjarima Community, Kumbotso Local Government Area of Kano State.

In 90.4% of the studied subjects the disease was not treated because of the belief that there is no

effective cure for it and that it reoccurs after treatment. But perhaps more importantly, the infection is not treated because it is considered a normal growing up process, which the infected person outgrows. A very high proportion of people depended on the schistosomiasis-infected river for all the domestic needs even where there are alternative sources of water. People argued that the river/stream give them purer water than the hand dug wells. Furthermore, swimming is a popular activity in the river during all seasons, irrespective of sex and age. In conclusion, the study has identified gaps in the knowledge of the cause and means of transmission, poor perception and management practices, which calls for systematic health education on schistosomiasis in the communities. The study observed poor knowledge of the disease even among the parents/guardians of the primary school pupils. They believe the blood in urine is a sign of sexual maturity and hence no need of seeking medical help. The mass educational enlightenment as emphasized by 4 needs to be instituted. The insurgency has a great impact in the spread of the diseases as most of the inhabitants who rarely go to the stream do so now due to lack of potable water and current security challenge in Dikwa.

IV. RESULTS

Table 1 : Prevalence of urinary schistosomiasis among the studied subjects

Subjects	Number examined	Number positive (%)
"Almajiris"	122	88 (72.1)
Pupils	180	59 (32.7)
TOTAL	302	147 (48.7)

Table 2 a : Age distribution of urinary schistosomiasis among primary school pupils

Age group	Number examined	Number positive (%)
7 - 11	94	25 (26.5)
12 – 16	86	34 (39.5)
Total	180	59 (32.7)

Table 2 b : Age distribution of urinary schistosomiasis among "Almajiris"

Age group	Number examined	Number positive (%)
7 - 11	72	42 (58.3)
12 – 16	50	46 (92)
Total	122	88 (72.1)

Table 3 : Prevalence by occupation of Pupils' parent

Occupation	Number examined	Number infected
Fishing	20	8 (40)
Farming	86	30 (34.8)
Artisan	20	11 (55)
Civil servant	16	3 (18.8)
Business	38	7 (18.4)
Total	180	59 (32.7)

Table 4 : Respondents' demographic information

	Response	Frequency	%
Reasons for visitation to Water body	Swimming	86	28.5
	Fishing	92	30.5
	Fetching	74	24.5
	Total	302	
Observation of blood During urination	Yes	55	18.2
	No	247	81.8
	Total	302	
Source of drinking water	Pipe borne	51	16.9
	Borehole	104	34.4
	Stream/River	147	48.7
	Total	302	
Visitation to clinic/ Hospital	Yes	29	10.6
	No	273	90.4
	Total	302	

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Hydrogen Peroxide-Silver 6%: an Effective Eco-Friendly Disinfectant for Contaminated Instruments

By Mohammad Hosein Kalantar Motamedi, Fina Navi, Ashkan Badkoobeh,
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Abstract- Background and aim: Healthcare workers are often in contact with micro-organisms present in blood, saliva, laboratory samples and specimens which may potentially transfer infectious diseases. Use of methods to remove and or decrease the number of contaminants on instruments, samples and tabletops are of paramount importance in infection control. Important properties of a good disinfectant aside from the ability to kill microbes include being safe, noncorrosive or damaging to instruments, odorless, colorless, economical and eco-friendly. This study was done to assess effectiveness and longevity of 6% Hydrogen Peroxide-silver for disinfection prior to sterilization.

Keywords: hydrogen peroxide silver 6%; bacillus subtilis; disinfection.

GJMR-C Classification : NLMC Code: QV 250



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Hydrogen Peroxide-Silver 6%: an Effective Eco-Friendly Disinfectant for Contaminated Instruments

Mohammad Hosein Kalantar Motamedi ^α, Fina Navi ^σ, Ashkan Badkoobeh ^ρ, Maryam Rezaei ^ω
& Javad Zardrang [¥]

Abstract- Background and aim: Healthcare workers are often in contact with micro-organisms present in blood, saliva, laboratory samples and specimens which may potentially transfer infectious diseases. Use of methods to remove and or decrease the number of contaminants on instruments, samples and tabletops are of paramount importance in infection control. Important properties of a good disinfectant aside from the ability to kill microbes include being safe, noncorrosive or damaging to instruments, odorless, colorless, economical and eco-friendly. This study was done to assess effectiveness and longevity of 6% Hydrogen Peroxide-silver for disinfection prior to sterilization.

Materials and Methods: Using sterilized physiological serum a spore suspension of *Bacillus subtilis* of 1×10^8 cfu/ml was prepared on McFarland culture medium. A sterilized capped tube was used for preparation of the suspension (control group); in another tube 2 ml of a newly opened bottle of 6% hydrogen peroxide silver was poured in the test tube using a sterilized pipette and the tube was recapped; then, 1 ml of the spore suspension was added to the test tube (test group). On the first day nine samples were taken (at 30, 60, 90, 120, 180, 240, 300, 360, and 420 minutes) and repeated three times. Also the same number of cultures were taken from the control groups at all the aforementioned time points. All 54 samples (study and controls) were transferred to the culture medium after the required time points elapsed. All cultures were placed in an incubator for 24 hours at 37°C and assessed for growth. This procedure was repeated daily using the same batch of 6% hydrogen peroxide silver for 10 days.

Results: The batch of 6% Hydrogen peroxide silver re-opened once daily was effective on *Bacillus subtilis* up to 8 days consecutive days use after contact for 30 minutes. There was no effect on day 8 even after 420 min. All control samples taken at the same time points showed viability and growth of *Bacillus subtilis*.

Conclusion: This study indicated that although 6% Hydrogen peroxide silver has a short 30 minutes disinfection time, it has a short-lived shelf life of only 7 days (provided it is opened just once per day). It seems prudent that a fresh bottle be used

daily and instruments be soaked longer than 30 for greater guarantee of disinfection prior to sterilization.

Keywords: hydrogen peroxide silver 6%; *bacillus subtilis*; disinfection.

I. INTRODUCTION

Healthcare providers (HCP) are in daily contact with microorganism in blood, saliva, laboratory samples and specimens which may potentially transfer infectious diseases. Continuous contact with micro-organisms has considerably increased the incidence of infectious diseases among HCP as compared to that of the society (1); 14 to 28 percent of dentists, 13 percent of assistants and 17 percent of percent of HCW have been exposed to HBV (2) and annually more than 200 HCP in the USA die from infection from HBV from their work environment(3). Blood and saliva may harbor viruses, bacteria and other pathogens that may cause diseases such as flu, HSV, pneumonia, TB, HBV and HIV. This highlights the importance of infection control at the workplace (1,4).

Use of methods to remove and or decrease the number of contaminants on instruments, samples and tabletops are of paramount importance in this regard.

Use of bactericidal solutions removing or reducing the count of microorganisms on instruments before autoclaving is imperative in preventing cross-infection. Reusable instruments that are hand-washed before processing can be hazardous (1). Thus, instruments should be disinfected and then sterilized to eliminate microbes and spores (5-7). We found no study available regarding disinfection time or shelf life of 6% hydrogen peroxide silver (HPS). So we decided to study the effect of this solution on spores of *Bacillus subtilis* to see if 6% hydrogen peroxide silver can be effective in disinfection of dental settings. The null hypothesis was that 6% HPS is not an effective disinfectant for the dental setting.

II. MATERIALS AND METHODS

Nano-Silver disinfectant an H₂O₂- Based solution (Nano-trade Company, Czech Republic) was assessed in this study. *Bacillus subtilis* (BS) spores ATCC6638 KD were purchased as spores with culture medium

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(Brown co, UK, certification by FDA and biologic test standards number 11138). A spore suspension with normal opacity 1×10^6 CFU/ML was prepared using sterilized physiological serum according to McFarland 0.5 standard. Then a sterilized sealed tube was used for preparing the suspension (controls); in another tube 2 ml of a newly opened bottle of 6% hydrogen peroxide silver was poured in the test tube using a sterilized pipette and the tube was recapped; then, 1 ml of the spore suspension with the same standard opacity was added to the test tube (test group) containing 6% HPS.

On the first day samples were taken from the tube after 30, 60, 90, 120, 180, 240, 300, 360, and 420 minutes and repeated three times. Also the same number of cultures were taken from the control groups at all the aforementioned time points. All 54 samples (study and controls) were transferred to the culture medium after the required time points elapsed. All cultures were placed in an incubator for 24 hours at 37°C and assessed for growth. This procedure was repeated daily using the same batch of 6% hydrogen peroxide silver for 10 days.

On days two, three, four, five, six, seven, eight, nine and ten, each day 54 samples were taken from the tubes containing Nano-silver (from the bottle re-opened once daily since day one) added to BS and incubated for 24h.

For sampling, a standard loop was flamed for 10 seconds and then the samples were prepared after the loop cooled. Each culture sample was repeated three times. A sample from the suspension was taken at each of the aforementioned time-points and then transferred to the nutrient agar (NA) immediately (without contact with Nano-silver for controls). Culture was done using 1 cc of the spore-contaminated solution added to nutrient agar using the linear technique. Then the cultures were placed in an incubator for 24 hours at 37 degree centigrade. Along with each series, a NA plate was placed inside the incubator and when no growth was observed, agar sterility was assured. On day two, the procedure was repeated in the same fashion except that samples were taken from the tube starting at the time it took HPS to kill the spores on day one. This procedure was repeated for 10 days.

III. RESULTS

On the first day, in the 27 samples taken from the tubes containing HPS and BS, no growth was seen on agar in the samples which had 30 min of contact or more; the 27 controls were all positive.

On days two, three, four, five, six and seven, in the 54 samples (27 study and 27 controls) were taken each day; from the tubes containing HPS (from the bottle re-opened once daily since day one) and added to BS, no growth was seen on agar in the samples

which had 30 min of contact or more; the 27 controls were all positive on all days.

On day eight, in the 27 study samples (study group) taken from the tubes containing HPS added to BS growth was seen at all time points (30 min and up to 420 minutes), on agar plates 24-48 h later. Growth was observed in all control samples at all stages every day indicating the viability of BS (at all stages). The growth of the control spores showed that the spores were viable; the case spores showed no-growth up until the eighth day. In other words, samples taken on the eighth day showed growth in all samples (24-48 h later on agar plates) even after 420 minutes of contact with the HPS solution. The bactericidal effect of HPS was apparently lost.

IV. DISCUSSION

Destroying or decreasing the number of microorganisms on reusable instruments before autoclaving is important in preventing cross-infection; in many offices reusable instruments are still hand-washed before processing (1). This may be dangerous; reusable instruments should be disinfected and then sterilized via autoclave, Gamma ray or ethylene oxide to kill the microbes and resistant spores. The spore is the most resistant form of the microbe. Bacterial spores are among the most resistant of all living cells to biocides (8).

Many studies have assessed similar solutions (9-16), but we only found one study regarding the shelf-life of Nano-silver disinfectant, an H₂O₂- Based solution (Nano-trade Company, Czech Republic), with concentration of 2% (17). We sought to study the effect of 6% Nano-silver solution on spores of *Bacillus subtilis* to see if 6% hydrogen peroxide silver can be an effective disinfectant in the workplace and if so for how long. This solution is for disinfection and not for sterilization. To assess how long it can be used after opening it once a day. Because this solution is natural with no color or odor it does not ruin instruments. It is noncorrosive and is odorless contrary to sodium hypochlorite. It does not stain either. However it is very volatile. There are many brands of disinfectants with different properties on the market; consumers have no idea about their real effectiveness or properties. Nano-silver disinfectant an H₂O₂- based solution with silver ions. Important properties of a good disinfectant aside from the ability to kill microbes includes being safe, noncorrosive, should not cause discoloration or damage to instruments and be economical and eco-friendly. This study was done to assess both effectiveness and longevity of 6% HPS for disinfection. Nano-silver is a newly marketed product and the producer claims that it has high level of disinfection without mentioning its shelf-life. As Nano-silver is an H₂O₂- based solution its effectiveness is based on releasing oxygen and thus, is short-lived.

Silver has strong antibacterial effects and does allow bacteria thrive and reacts with SH groups to create oxidative enzymes. Silver is known to exhibit a strong toxicity to a wide range of micro-organisms. Bactericidal effect of silver ions on micro-organisms is well known, but the mechanism is only partially understood (18). A proposed theory describes that ionic silver strongly interacts with thiol groups of vital enzymes and inactivates them and has extensive use in many bactericidal applications (18).

A recent study was done to assess the shelf-life of 2% hydrogen peroxide-silver, It was indicated that the effect time was 180 minutes and efficacy of the solution was up to 4 days (17), However 6% HPS in our study was more potent and disinfected in a shorter time (30 min) and was effective for a longer time after opening proving that the 6% solution is preferable.

The cultures were taken at 30 to 420 on day one because the exact time of effectiveness on the BS spore was unknown. Lack of growth of BS spores after contact with Nano-silver on day one was 30 min. This time period of half an hour is reasonable for disinfection of instruments comparing to the three hours waiting time of the 2% hydrogen peroxide-silver solution; Additionally , as the disinfection is ineffective after 7 seven days , a new bottle must be opened in less than 7 days to assure safety.

V. CONCLUSION

Instruments should be soaked in 6% hydrogen peroxide-silver for at least half an hour before being sterilized in an autoclave; 6% hydrogen peroxide-silver will not disinfect after this. Thus this refutes the null hypothesis provided a fresh bottle is used daily for greater guarantee of disinfection in a shorter time period.

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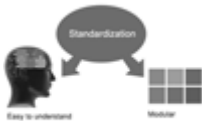


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Complete support for both authors and co-author is provided.

4. MANUSCRIPT'S CATEGORY

Based on potential and nature, the manuscript can be categorized under the following heads:

Original research paper: Such papers are reports of high-level significant original research work.

Review papers: These are concise, significant but helpful and decisive topics for young researchers.

Research articles: These are handled with small investigation and applications

Research letters: The letters are small and concise comments on previously published matters.

5. STRUCTURE AND FORMAT OF MANUSCRIPT

The recommended size of original research paper is less than seven thousand words, review papers fewer than seven thousands words also. Preparation of research paper or how to write research paper, are major hurdle, while writing manuscript. The research articles and research letters should be fewer than three thousand words, the structure original research paper; sometime review paper should be as follows:

Papers: These are reports of significant research (typically less than 7000 words equivalent, including tables, figures, references), and comprise:

(a) Title should be relevant and commensurate with the theme of the paper.

(b) A brief Summary, "Abstract" (less than 150 words) containing the major results and conclusions.

(c) Up to ten keywords, that precisely identifies the paper's subject, purpose, and focus.

(d) An Introduction, giving necessary background excluding subheadings; objectives must be clearly declared.

(e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition; sources of information must be given and numerical methods must be specified by reference, unless non-standard.

(f) Results should be presented concisely, by well-designed tables and/or figures; the same data may not be used in both; suitable statistical data should be given. All data must be obtained with attention to numerical detail in the planning stage. As reproduced design has been recognized to be important to experiments for a considerable time, the Editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned un-refereed;

(g) Discussion should cover the implications and consequences, not just recapitulating the results; conclusions should be summarizing.

(h) Brief Acknowledgements.

(i) References in the proper form.

Authors should very cautiously consider the preparation of papers to ensure that they communicate efficiently. Papers are much more likely to be accepted, if they are cautiously designed and laid out, contain few or no errors, are summarizing, and be conventional to the approach and instructions. They will in addition, be published with much less delays than those that require much technical and editorial correction.



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It is vital, that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

Format

Language: The language of publication is UK English. Authors, for whom English is a second language, must have their manuscript efficiently edited by an English-speaking person before submission to make sure that, the English is of high excellence. It is preferable, that manuscripts should be professionally edited.

Standard Usage, Abbreviations, and Units: Spelling and hyphenation should be conventional to The Concise Oxford English Dictionary. Statistics and measurements should at all times be given in figures, e.g. 16 min, except for when the number begins a sentence. When the number does not refer to a unit of measurement it should be spelt in full unless, it is 160 or greater.

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Metric SI units are supposed to generally be used excluding where they conflict with current practice or are confusing. For illustration, 1.4 l rather than $1.4 \times 10^{-3} \text{ m}^3$, or 4 mm somewhat than $4 \times 10^{-3} \text{ m}$. Chemical formula and solutions must identify the form used, e.g. anhydrous or hydrated, and the concentration must be in clearly defined units. Common species names should be followed by underlines at the first mention. For following use the generic name should be constricted to a single letter, if it is clear.

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- It may take the discovery of only one relevant paper to let steer in the right keyword direction because in most databases, the keywords under which a research paper is abstracted are listed with the paper.
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Acknowledgements: Please make these as concise as possible.

References

References follow the Harvard scheme of referencing. References in the text should cite the authors' names followed by the time of their publication, unless there are three or more authors when simply the first author's name is quoted followed by et al. unpublished work has to only be cited where necessary, and only in the text. Copies of references in press in other journals have to be supplied with submitted typescripts. It is necessary that all citations and references be carefully checked before submission, as mistakes or omissions will cause delays.

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27. Refresh your mind after intervals: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

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34. After conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium through which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

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The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently. You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.



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- Manuscript should complement any figures or tables, not duplicate the identical information.
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Approach

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- If you desire, you may place your figures and tables properly within the text of your results part.

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- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

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<i>References</i>	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring



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