DIAGNOSIS OF SUPERFICIAL MYCOSES BY DIRECT MICROSCOPY - A STATISTICAL EVALUATION

JC Mohanty, SK Mohanty, RC Sahoo, A Sahoo, CH.NR Praharaj

A mycological study was undertaken in 250 cases of superficial mycotic infections, which included 210 cases of dermatophytosis, 18 cases of cutaneous candidiasis and 22 cases of tinea versicolor. The scrapings from all the cases were subjected to direct microscopic examination in 10% KOH solution and culture was done in case of candidiasis and dermatophytosis. Out of 250 cases direct microscopy was positive (KOH +ve) in 88 cases of dermatophytosis, 11 cases of candidiasis and all cases of tinea versicolor. Culture for dermatophytes and candida species in SDA medium were positive in 76 and 9 cases respectively. The diagnostic sensitivity, specificity, positive predictive value, negative predictive value and the overall efficiency of the direct microscopy in the diagnosis of superficial mycotic infections were calculated to be 89.41%, 83.90%, 76.76%, 93.02% and 85.96% respectively.

Key Words : Superficial mycoses, Positive predictive value, Negative predictive value

Introduction

Superficial mycotic infections constitute the main bulk of mycotic diseases in India. The three main superficial fungal infections are dermatophytosis, candidiasis and tinea versicolor.[1] Studies on superficial mycoses in India have received increasing attention in recent years and a number of reports are available from different parts of the country by eminent workers.[2-4] Although the diagnosis of superficial fungal infections may be strongly suspected on clinical grounds, it is usually prudent and sometimes essential to seek laboratory aid.[5] The laboratory diagnosis includes the direct microscopic examination of the specimen in 10% KOH solution and culture in Sabouraud's dextrose agar (SDA) medium. In experienced hands the direct microscopic examination in 10% KOH solution is one of the most useful procedure in medical mycology and it has been adjudged more reliable than culture for demonstrating dermatophytes.[6] However it is best not to rely routiney solely on cultures. Keeping this in view the present study was undertaken to find out the sensitivity, specificity, positive predictive value, negative predictive value and overall efficiency of direct microscopy in the diagnosis of superficial mycoses, especially in the out patient department.

From the Department of Microbiology and Department of Skin and VD M. K. C. G. Medical College, Berhampur-760 004, (Orissa)

Materials and Methods

The present study was carried out in 250 clinically diagnosed cases of superficial mycoses from Skin and VD OPD of M.K.C.G. Medical College Hospital, Berhampur. The sites of lesion were thouroughly cleaned with 70% alchohol. The samples were collected in a sterile paper packet by scraping across the inflamed margin of the lesions by the help of a disposable scalpel blade. In onychomycosis the subungual friable debris was collected. Infected hairs were collected by plucking with epilating forceps so that the hair roots are preserved intact. The samples obtained were subjected for a thorough mycological study.

A small quantity of the material (skin, nail, hair) was placed in a drop of 10% KOH solution on a microscope

slide and a coverslip was placed over it. Then the slide was gently warmed over the flame to bring about clearing and

Table I. Direct microscopy (KOH +ve and KOH -ve) in different mycotic infections

Superficial mycotic infections	No.of cases studied	KOH +ve	KOH-ve
1. Dermatophytosis	210	88	122
2. Cutaneous candidiasis	18	11	7
3. Tinea versicolor	22	22	--
	250	121	129

Out of total 250 cases studied, 121 were positive by direct microscopy. Typical fungal elements of M. furufr were identified in all cases of tinea versicolor by direct microscopy.

Table II. Identification and isolation of fungus by direct microscopy and culture

Total No. of scrapings	Total No.of KOH +ve	KOH + Cul.+	KOH- Cul.+	Total Cul.+
228	99	Dermatophyte-69 Candida spp. -7	Dermatophytes-7 Candida spp. -2	85
	99	76	9	85

Out of total 228 scrapings (candidiasis and dermatophytosis) 99 were positive in direct microscopy. KOH +ve and culture +ve were 76 where as KOH -ve and culture +ve were 9 only.

Table III. Statistical data in relation to direct microscopy

Statistical data	Percentage
1. Diagnostic sensitivity	89. 41
2. Diagnostic specificity	83. 90
3. Positive predictive value	76. 76
4. Negative predictive value	93. 02
5. Overall efficiency	85. 96

the preparation was left inside a petri dish for 20 minutes or more if the specimen was very thick. Then the slide was examined under the microscope for the presence of fungal elements. It was sometimes necessary for nails to be kept in 10% KOH solution overnight to dissolve completely for microscopic examination.

The specimens were cultured in SDA medium with chloramphenicol (0.05mg.ml.) and cyclohexamide (0.5mg.ml.). Fungal species were identified on the basis of cultural characteristics, pigment production, microscopic examination in lactophenol cotton blue preparation and slide culture whenever necessary.

From the results obtained by direct microscopy (KOH +ve, KOH -ve) and culture (Cul +ve, Cul -ve) different statistical data like diagnostic sensitivity and specificity, positive predictive value, negative predictive value and overall efficiency of the direct microscopy were calculated.[7]

Results

In the direct microscopic examination, the fungal elements seen in superficial mycoses were the septate branching hyphae of dermatophytes, the short mycelial elements and clumps of round spores (spaghetti and meat ball) of Malassezia furfur and the pseudohyphae and blastospores of candida. The samples showing fungal elements in direct microscopy were called KOH +ve and those didn't, were called KOH -ve.

Discussion

Out of 250 clinically diagnosed cases of superficial mycotic infections fungal elements were found by direct microscopy in 48.40% of cases. Direct microscopy was positive in all cases of tinea versicolor showing 100% diagnostic efficacy in diagnosing these cases. Out of 228 specimens subjected for culture, dermatophytes were isolated in 85 cases and candida species in 9 cases. The sensitivity, specificity, positive predictive value, negative predictive value and the overall efficiency of the direct microscopy were calculated to be 89.41%, 83.90%, 76.75%, 93.02% and 85.96% respectively. As the sum of the sensitivity and specificity is far more than 100%, the direct microscopy was proved to be a very good and reliable method in diagnosing the cases of superficial mycoses. Had it been 100%, the test would be no better than loss of a coin. The above statistical data in our series were also compared with that of different workers from different parts

of our country (Table -IV).

Malassezia furfur was easiest to be identified and

Table IV. **Incidence of KOH +ve, culture +ve and various statistical data as compared with results from different parts of India**

Name of Author Place and Year	Total cases	Total KOH+	Total Cul.+	KOH+ Cul.+	KOH- Cul.+	Diagnostic Sensitivity	Diagnostic Specificity	Positive Predictive value	Negative Predictive value	Overall efficiency of Direct microscopy
1. Vasu B H. Warrangel/1966	203	100	83	54	29	65.06%	61.66%	54%	71.8%	63.05%
2. Verma B.S et al Baroda /.970	100	75	36	33	3	91.77%	34.775	44%	88%	55%
3. Pankajalaxmi,et al Madras/1981	535	435	240	226	14	94.16%	29.15%	51.95%	86%	58.31%
4. Poria N C, et al Jamnagar/1981	300	192	115	90	25	78.26%	44.86%	46.87%	76.85%	57.66%
5. Sharma N L, et al Simla/1987	114	101	52	48	2	96%	14.51%	47.52%	81.8%	50%
6. Karmakar et al Rajastan/1995	250	215	104	98	6	94.2%	19.86%	45.58%	82.85%	50.8%
7. Mallick A K, et al Rohtak/1996	250	89	134	58	76	43.28%	73.27%	65.16%	52.79%	57.2%
8. Present Study Orissa/1997	228	99	85	76	9	89.41%	83.9%	76.76%	93.02%	85.96%

direct microscopy is usually enough to confirm diagnosis.[8] Regarding dermatophytes, the mycelium of *E. floccosum* was usually easily seen with its prominent beaded hyphae. The long delicate hypae of *T. mentagrophytes* and broad, more regular hyphae of *T. rubrum* were also found fairly easily. The pseudohyphae and blastospores of candida, though difficult, were rarely missed in expert hands.

So the direct microscopy is as good as culture in the diagnosis of superficial mycoses and a clinician with experience in this method, can frequently diagnose the type of superficial fungal infection by this simple time saving method in his consulting chamber. Again, this method can be adopted in the OPD as a routine diagnostic test, where in the hand of skilled personnel it can give instantaneous diagnosis.

Acknowledgement

We are highly grateful to Dr. S.S. Mishra, Assistant Professor, Dept. of Pharmacology M.K.C.G. Medical College, Berhampur for his valuable help in the statistical analysis of the data.

References

1. Oberai C, Miskeen AK. Superficial fungal infections, In: IADVL Textbook and Atlas of Dermatology, Edited by Valia RG, Valia AR, Siddappa K, Bhalani Publishing House Bombay, 1994;173-212.

2. Kalra SL., Mohapatra LN. Etiology of dermatophytosis in Delhi, Ind J Med Res 1964;52:553-558.

3. Verma BS. Vaishnav VP, Bhatt R.PA study of dermatomycosis. Indian J Dermatol Venereol. 1970;36:182-184.

4. Pankajalakshmi VV. Subramanian S. Mycoses in Madras (superficial), Indian J Dermatol Venereol. 1974;40:228-235.

5. Roberts SOB, Mackenzie DWR. Mycology. In : Textbook of Dermatology, Edited by Rook A, Wilkinson DS, Ebling FJG, Oxford University Press Bombay1987;885-986.

6. Stoughton RB. Dermatophytosis. In: Medical Microbiology and Infectious Diseases, Edited by Braude AI, WB Saunders, Philadelphia 1981;1566-1573.

7. Cembrowski GS, Sullivan AM. Quality control and statistics. In: Clinical Chemistry: Principles, Procedures, Correlations. Edited by Bishop ML, Duben-Engelkirk JL, Fody EP; J.B Lippincott Company, Philadelphia 1992;63-101.

8. Robles WS. Laboratory diagnosis of tropical fungal infections, Tropical Doctor 1992; (Suppl I): 91-96.