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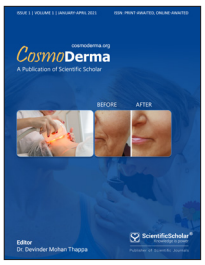

Innovations

Cost-effective method of dark field microscopy in everyday practice

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PROBLEM

Dark-field microscopy is an optical tool that is used in the field of venereology. In contrast to bright-field microscopy, it has the advantage of increasing background contrast to the object thus providing better sensitivity for diagnosis.[1]

It is the most specific and sensitive technique to diagnose syphilis in the primary stage and can confirm the diagnosis before serological testing. However, dark field microscopes are quite expensive and not widely used. Hence, we are proposing a cost effective novel method to convert a light microscope into a dark field microscope that can be used in resource poor settings.

SOLUTION

Principle

The dark ground microscope creates a contrast between the object and the surrounding field, such that, the background is dark, and the object is bright. The objective and the ocular lenses used in the dark field microscope are the same as in the ordinary light microscope, with the addition of

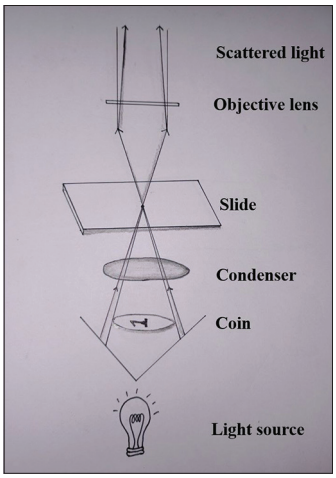

Figure 1: Illustration of the principle of dark field microscopy.

Figure 2: Correct placement of the coin beneath the condenser.

Video 1: Video demonstration of the coin technique for dark field conversion.

a special Abbe darkfield condenser or a black annular opaque filter which is used to prevent the transmitted light from directly illuminating the specimen. Only oblique scattered light reaches the specimen and passes onto the lens system causing the object to appear bright against a dark background.[2,3]

Procedure

Instead of using a special filter, a one-rupee coin is beneath the condenser as shown in [Figures 1 and 2, Video 1]. The size of the coin must be smaller than that of the condenser such that the rays emerging from the periphery form an inverted hollow cone of light with the focus centered on the specimen plane. Here, the one-rupee coin is selected as its specific diameter of 22 mm allows adequate occlusion while allowing the periphery to be illuminated.

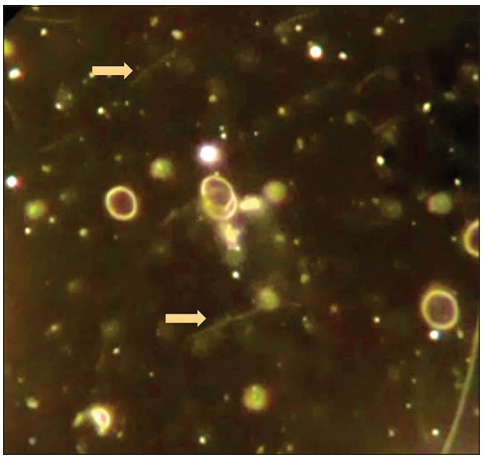

Figure 3: Visualization of treponema under dark field microscopy.

When a specimen is placed on a slide, the oblique rays interact with the specimen and are reflected by it. This allows these faint rays to enter the objective lens. The result is a bright specimen on a dark background aiding in the visualization of the treponema as shown in [Figure 3].

CONCLUSION

Our technique is a simple and cost-effective method and can be used in a resource poor setting. The illumination of a dark ground microscope through this method allows for easy detection of treponemes as compared to the ordinary light microscope thus aiding in early diagnosis and treatment.

Declaration of patient consent

Patient's consent not required as there are no patients in this study.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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