Assessment of Nutritional factor on the growth of Histoplasma Capsulatum

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Abstract – *Histoplasma Capsulatum is a genus of dimorphic fungi commonly found in bird and bat faecal material they causes histoplasmosis. In this study it has been try to observe the growth performance of Histoplasma Capsulatum in various nutritional factors. The growth performances vary on different nutritional sources. In nutritional sources carbohydrate, protein & vitamins were taken for study. In carbohydrate starch was found to be the best growth promoting substance. In protein leucine and in vitamin thiamine is the best growth promoting substance. In other way lactose, Cystein and choline is responsible for retarding the growth, Bogus lawsky G, etal, 1874, 1773.*

Introduction – Nutritional factor like the sources of carbon, nitrogen, vitamins determine the rate of spore development under natural conditions. Fungi come across diverse types of nutrients in nature. The capacity of majority of the moulds of being able to reproduce, well in nature reflects the ability to complete their metabolic process under which fungi speculate well are sometimes quite different from those required for growth. It has been observed that speculation of plant parasites in nature is generally more intense when there is a decrease in the supply of nutrients, laboratory experiment carried out on a wide range of fungal organisms show that concentration of the medium as well as nature of the sources of carbon, nitrogen, vitamins available to the fungus play a major role in determining the

frequency of their sporulation (Hawker 1947). Usually lower concentrations of C/N ratio are recommended for inducing and promoting fungal sporulation under laboratory conditions. (Periris 1947), Hasija (1947), Agrawal (1958) glucose and hexose are good growth of sporulation, Singh & Tandon (1970), whereas aspergillus is an also good source of good source of growth but unfavorable for sporulation. Agrawal and Ganguli (1966), Dayal and Ram (1968), Singh and Tendon (1970). A no of vitamins are also known to have stimulatory effect on reproduction of fungi. According to AE Area leao, Adolpho da Rocha Furtado (2005). Vitamins K were evaluated for fungi static activity on the following dermatophytes. M.Canis, Epidermophyton floccose-, Trychophyton mentagrophytes, Trychophyton schonleini. Histoplasma Capsulatum is a species of dormic fungi, belongs top Ascomycetes group. Finally a chemically defined medium composed of inorganic salts, glucose, asparagines, cysteine and vitamin supplement has been devised for growth of the yeast phase of Histoplasma Capsulatum. Growth in this medium was abundant and compared favorably with that in media containing complex natural material. No specific amino acid was required for growth of the yeast phase but an organic source of Sulphur and one of nitrogen were essential.

Method

Selected fungal species were grown on a thin layer of SDA medium in petridish at room temperature. After incubation period of 10 days 5mmm blocks of grown fungal were cut and transferred using asceptic technique to 250ml conical flask containing 50ml liquid medium of specific composition of nutrition (carbohydrate, protein and vitamins) to study the specific physiological aspect of the concern fungi .PH of the medium was adjusted to 5.8 with the help of 0.1MKOH and 0.5MKH2PO4 solution and incubated for 15 days at 25^{o} $^{c.}$ .After the incubation periods of 15 days the mycelial mats were collected by filtering them through pre-weight whatmans one to one filter paper individually and it was transferred to label butter paper envelop. It was dried in side and incubates at temp. 6o ± 1 ^{o}c. After 24 hrs. of this drying

procedure the envelope with mycelial mats were kept in a sealed desicator over fused d $cacl_2$ for 24 hrs. The actual weight of fungal mycelial mats was calculated using the formula:-

$$W=W_2-W_1$$

W = Wt. of the mycelium

W_1 = Wt. of the filter paper.

W_2 = Wt. of the filter paper with mycelial.

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The available data of mean dry weight of mycelium was calculated along with standard Error (SE), the data were further analysed statistically for anova and critical difference (CD).

Observation: - Table 1

PH 5.8 Tem.25^{o}c wt expressed in mg

SD Media of Carbohydrate	Mycelial mats of Capsulatum
Xylose	350.222 ± 1.50
Sucrose	302.000 ±0.62
Lactose	240.000 ±0.45
Glucose	602.000±6.60
Maltose	346.000±0.97

Control CD	980.385±0.92

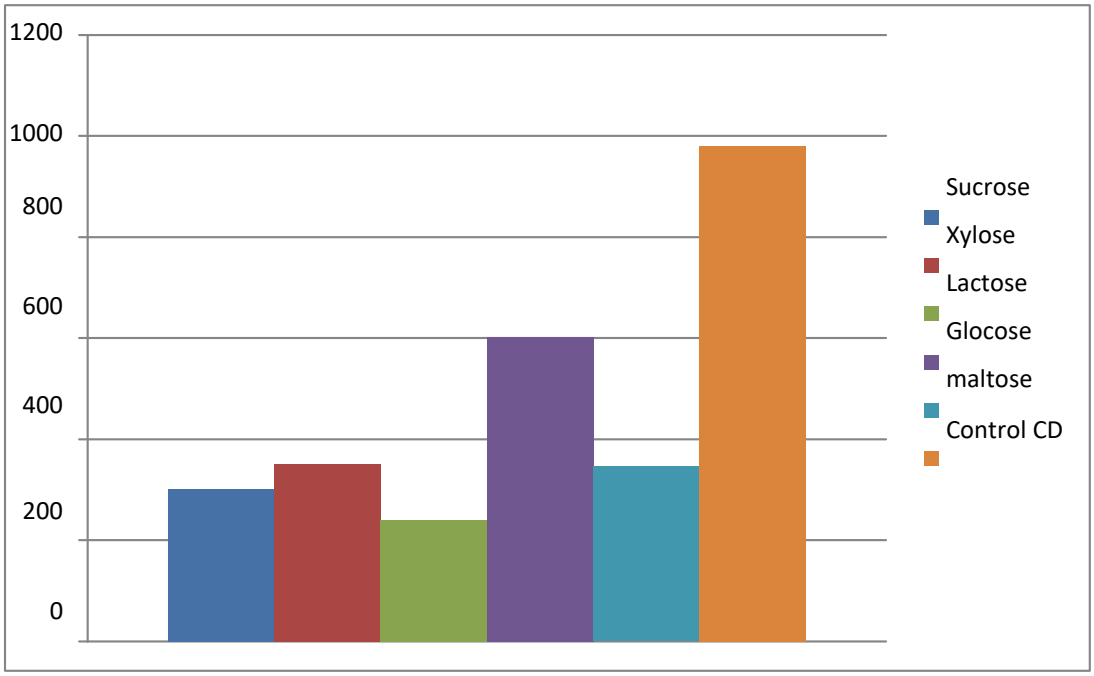


Table 2

PH 5.8 Tem.25^{o}c wt. expressed in mg

Amino Acids	Mycelium mat
L Serine	70.000
DL Vanine	58.333
L Arginine	68.222
Leucine	78.222
L Cystein	14.334
Control Cd	8.666

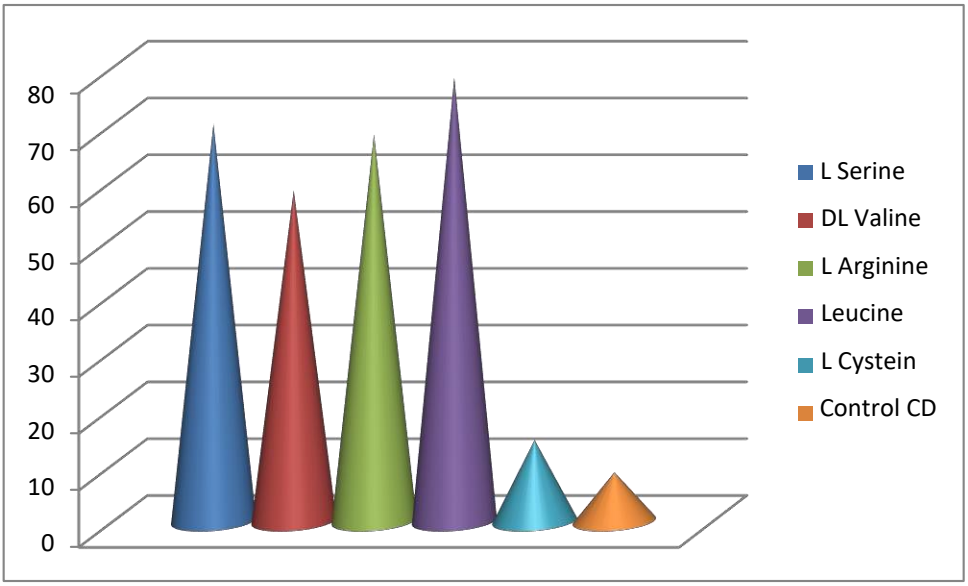
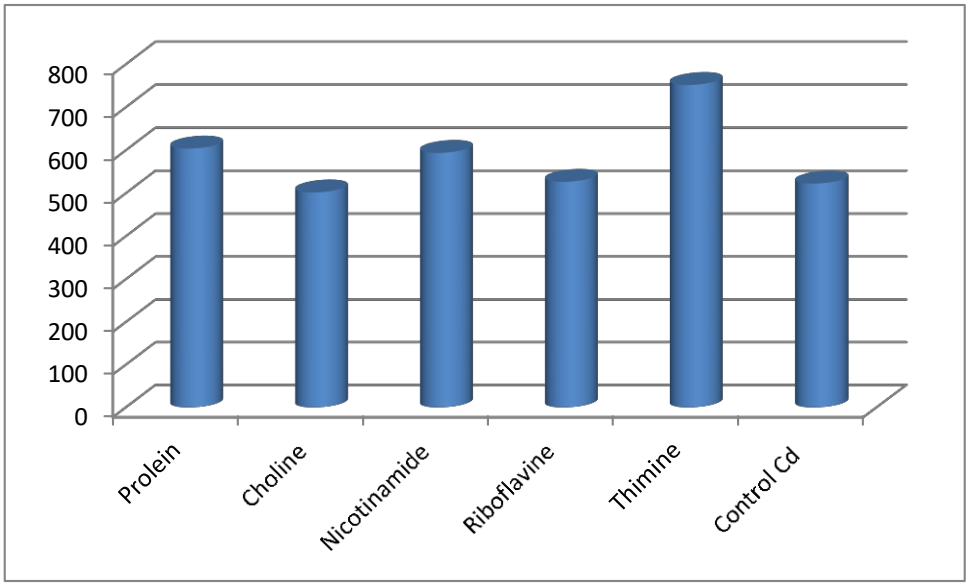


Table 3

PH 5.8 Tem.25°c wt. expressed in mg

Vitamins	Histoplasma Capsulatum
Prolein	604.000
Choline	502.000
Nicotinamide	594.000
Riboflavine	526.666
Thimine	752.000
Control Cd	522.666



Anova Table 4. 5. 6

Results; -

In case of Carbohydrates nutrients

In case of Histoplasma Capsulatum glucose and in control condition in1 % was seen to be the best growth of fungal mycelia and lactose was found to be the worst growth of this fungus. They are arranged like as in ascending order

Lactose < sucrose <maltose <xylose < glucose < control

In case of protein nutrients

In case of Histoplasma Capsulatum max growth of fungal mycelial were occur in amino acid leucine while worst growth of fungal mycelial were occur in L.cystein. The growth performances are as: -

Control < L Cystein < DL valine < AL Arginine < L serine < Leucine.

In case of vitamins

In case of Histoplasma Capsulatum max growth of fungal were observed in Thiamine and the least growth of fungal were observed in choline. The growth performance are arranged in ascending order which are as –

Choline <control <Riboflavin< Nicotinamide <Proline <Thiamine

Discussion: - The volume of literature on the affect of carbohydrate on the growth of Dermatophytic fungi is small .The growth of complex sugar polymers in the present study points towards the saprophytic nature of the fungus which is the similar to the view of the workers. Mandels eatal 1948, Goroden 1953, Ajello1953, 1956, Durie et-al 1955-curie et-al. Nitrate nitrogen which is generally good for fungal growth is also reported to the good for sporulation. In several fungi (Tandon & Grewal(1956),Tandon and Chandra (1961), several authors observed the Morphogenesis of dermatophytes i.e. Bakar EE(1942),Benham RD, Binazim etal (1983), Black and Wright , Boguslawsky, la etal 1979, Bronsten DM(1983).

The influence of amino acid on the growth Dermatophytic fungi has not been worked out for large no of Species. Through these nutritional sources has been useless tool for the differentiation of the strains of the Species. George 1951. The Concentration of nitrogenous substance required for including good sporulation. High concentration substances are generally harmful for reproduction. Grower (1964) reported that amino acid which promote good growth of Aspergillus flavus may not be enhanced the sporulation in same ratio. Histoplasma require cystein and other sulfur containing amino acid for growth and yeast conversion (sliva 1958, Gallarria and Laffer 1962, Mc vein & Monoh 1965 Mc Ginnis 1980). Asparagine which is good source for growth is generally unfavorable for sporulation Singh and Tandon 1970, Dayal and Ram
1968,. Ammonium Compounds inhibit the spore development in Pestalotiopsis Versicolor Agrawal and Ganguli 1960, Singh and Tandon (1970), Ali Asgar etal, Heshn etal, K DH, Jacobsin ES, N ginen NT, Pandey Dk, et-al Sarojani and MC et-al 2006. . **Several studies of the influence of vitamin on the growth of Dermatophytic fungi have been reported. Thiamine hydrochloride has been found to enhance best growth for T.**

violaceum causing ring worm. Nutritional study based on ability to assimilate different vitamin along with carbon and nitrogen sources have been used to differentiate various Species of genus. Trychophyton Swartz & George 1955 philoport 1977. According to A.E. Area leao, Adolphdarocha Furtado (2005), Vitamin K was evaluated for their fungi static activity on the following dermatophytes, M.Canis, Epidermophyton flococcsum, T. mentagrophytes. T. Schonleini. The fungi static activities of Vitamin K are higher in liquid than in solid medium. Several authors observed the growth of fungus on the availability of nutritional sources such as Baker EE and Mark EM(1942, Benham RN(1948, Biharzi M; Papini M; Simonatt; skin mycoses(1983), Blacks and Wright(1955).

Conclusion:

For the study of growth performance of Histoplasma Capsulatum in various nutrition intakes in SD medium, various results came into light. After adding of carbohydrates nutritional factor. It was found glucose was the most promoters for the growth of fungi whereas lactose was proved to the worst growth of Histoplasma Capsulatum. In addition to different amino acids in SD. Media, leucine showed max growth of the fungi while cystein showed least grown i.e. check the grown of fungi. In Vit doses addition in media, thiamine was proved to be best growth promoter of the H. Capsulatum. Choline and in control condition, the growth of H. Capsulatum was least.

In this study three nutritional factors various group of carbohydrate proteins & Vitamin were taken for the grown of H. Capsulatum, but carbohydrates and vitamins groups were proved to the best promoter for the growth of H. Capsulatum. Whereas nitrogenous compounds i.e. amino acids were the weak promoter for the grown of dermatophytes i.e. H. Capsulatum Generally it is known that dermatophytes are responsible for causing skin diseases. Here in this study we also observed that a nitrogenous source compounds i.e. amino acids which showed least growth i.e. checks the growth of dermatophytes. It means they cause the growth of dermatophytes which

cause skin disease i.e. used in allopathic medical purposes for controlling the skin disease caused by H. Capsulatum.

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