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Application of Data Analysis and Presentation for Population Dynamics of *Cotugnia* sp. Parasitizing Domestic Fowl

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ABSTRACT

Goal of this paper is to present the techniques of Data Analysis and Presentation for population dynamics of Cestode parasite *Cotugnia sp.* parasitizing domestic fowl *Gallus gallus domesticus* from different localities of Nanded District (M.S.) India during October, 2014 to September, 2015. High incidence, density and index of infection were reported in Summer followed by Winter whereas infection was low in monsoon.

***Keywords*:** Computer aided Techniques; *Cotugnia* sp.; Domestic Fowl; Nanded; Population Dynamics

1. INTRODUCTION

Livestock animals like domestic fowl, *Gallus gallus domesticus* have a great Socio-economic importance than other animals domesticated by humans. It is important item of human food as well as source of income due to production of meat, fiber and other substances. India recorded the fastest growth rate in poultry meat production during 1985-1995 with a growth rate about 18% per annum which perhaps, no other country or agro-industry in the world has recorded, during that period. India ranks third in egg production and sixth in broiler meat production (USDA, 2011). At present more than 400 million broiler

chicks are produced annually. Farmers of Marathwada Region used fertilizer which is formed from domestic fowl in their fields to increase soil fertility. But these domestic fowl are infected with Cestode infection which is responsible for mortality and economic losses in a number of instances. The domestic chicken feeds on a wide variety of food substances ranging from grains, fruits to insects which may harbour infective stages of parasites thereby predisposing them to parasitic infection particularly gastro-intestinal parasites (Oniye, *et al.*, 2001; Frantovo, 2000). Helminth parasites are a major cause of the decline in poultry productivity (delay of growth, reduced egg production, death of young birds).

Notable contribution made in population dynamics of helminth parasites by Dobson, (1961& 1965); Dogiel et. al., (1954); Johnson, (1964); Anderson, (1974); Kenddey, (1975) & Moller et. al., (1995) Poulin, R. (1995), Rajeshwar Rao (1983) and Rohde, (1993). Keeping in view, importance of cestode infections of domestic fowl, present study was designed to evaluate the population dynamics by using computer aided techniques. In this work, data is summarized and presented in various forms viz. Tabulation, diagrammatic and graphic representation.

2. MATERIALS AND METHODS

2. 1. Study area and period

Study was conducted in different collection sites of Nanded district (Fig. 1). Nanded is situated in south eastern part of Maharashtra State. The Nanded district lies between 18.15 to 19.55 North latitudes and 97.07 to 98.15 East longitude. It covers an area of 10,528 sq. km. The survey was conducted from October, 2014 to September, 2015.

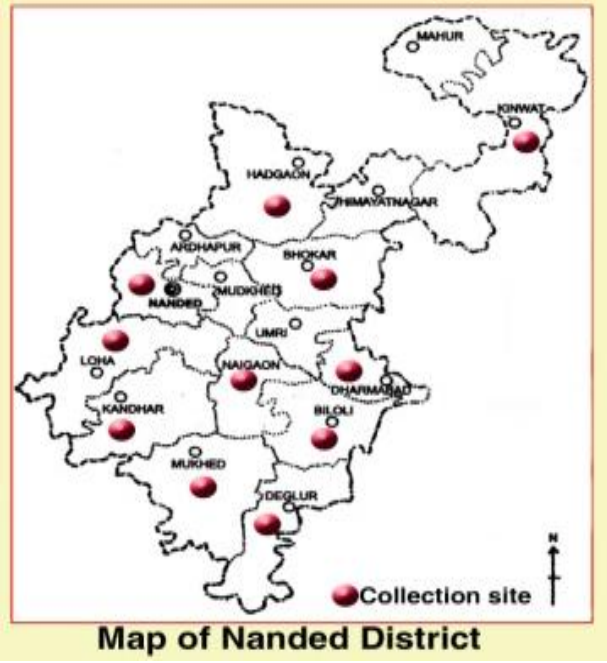


Fig. 1. Study Area

Fig. 2. Host *Gallus gallus domesticus*

Intestines of domestic fowl *Gallus gallus domesticus* (Fig. 2*)* were examined for infection of Cestodes during period of October, 2014 to September, 2015 from Nanded District, Maharashtra State India. Collected Cestodes were preserved in hot 4% formalin, stained with Borax carmine, dehydrated in asending grades of alcohol, cleared in xylene, mounted in D.P.X. Drawings are made with the aid of camera lucida attachments. Photomicrographs were taken by Trinocular computerized Research microscope. On taxonomic observations identified Cestode *Cotugnia* sp.

2. 2. Statistical analysis

The prevalence, intensity, density and index of infection were recorded and calculated according to Margolis et.al., (1982).

Population dynamics are determined by following formulae

$$\text{Incidence of Infection} = \frac{\text{Infected hosts}}{\text{Total hosts examined}} \times 100$$

$$\text{Intensity of Infection} = \frac{\text{No. of parasites collected in a sample}}{\text{No. of infected hosts}}$$

$$\text{Density of Infection} = \frac{\text{Number of parasites collected in a sample}}{\text{Total hosts examined}}$$

$$\text{Index of Infection} = \frac{\text{No. of hosts infected x No. of parasite collected}}{(\text{Total hosts examined})^2}$$

3. RESULTS AND DISCUSSION

Results of present studies on Population dynamics of *Cotugnia* sp. of domestic fowl are presented in Table No. 01 & Graph 1 to 4.

Generic Diagnosis: (Fig. 3) Genus *Cotugnia* was erected by Diamare, 1893 with type species *C. digonopora* (Pasqule, 1890) collected from domestic fowl.

Scolex is globular, bears four suckers, almost of equal size, rounded, muscular. Rostellum large, oval, rectangular with hooks. Scolex followed by short neck. Mature segments almost broader than long, with double set of reproductive organs. Testes are 110-120 in numbers, oval to rounded in shape, Cirrus pouch large, oval, elongated, Cirrus short, thin, slightly curved within the cirrus pouch , vas deferens tubular, curved, Genital pore oval, marginal, Vagina is a thin tube, opens from the genital pores, posterior to cirrus pouch and forms receptaculum seminis. Ootype is medium, rounded. Ovary bilobed. Vitelline glands rounded, Post-ovarian. Longitudinal excretory canal present on either sides of the segments.

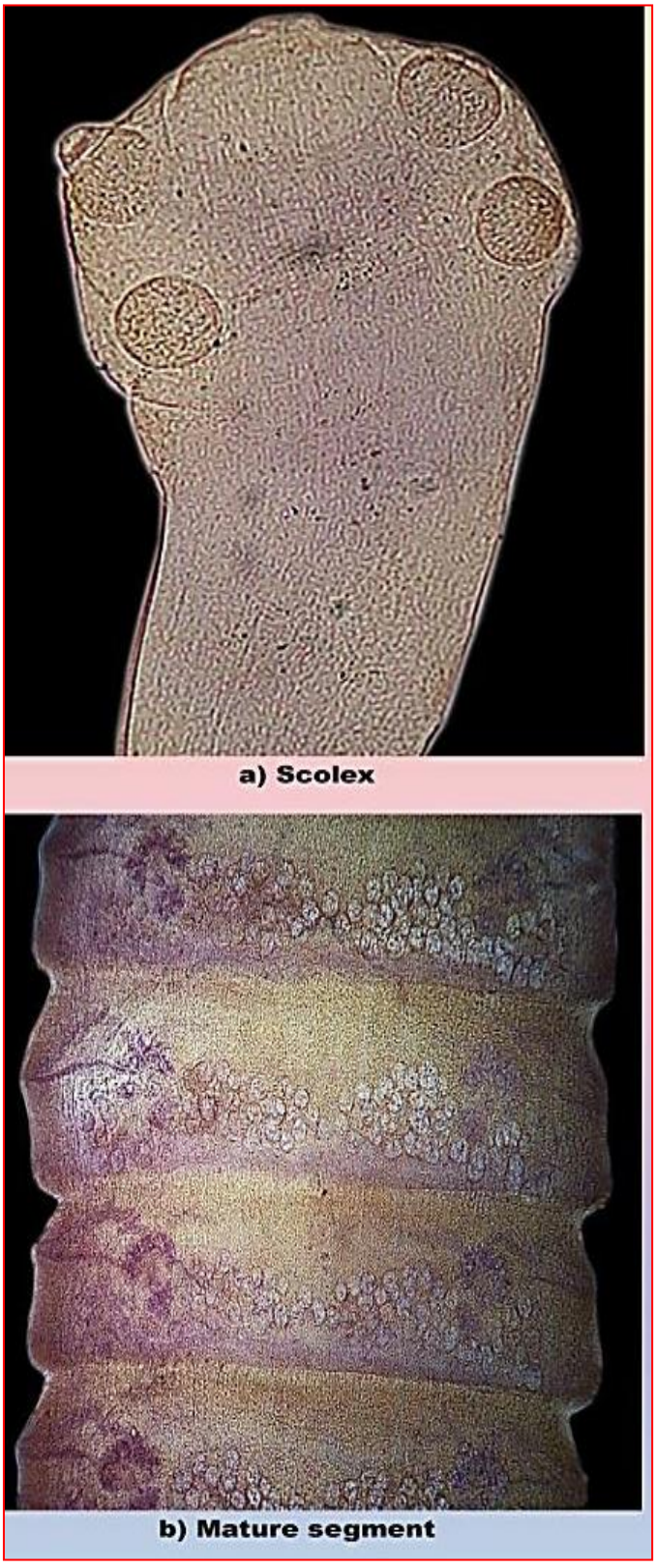


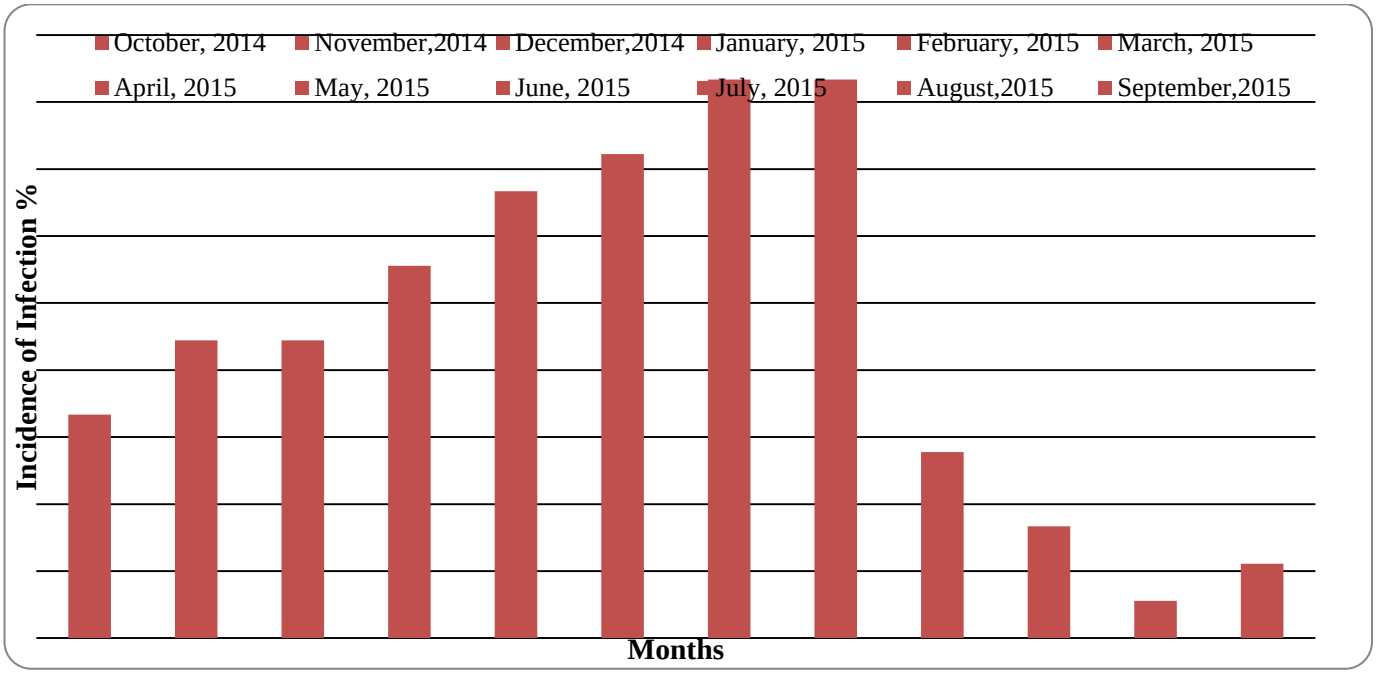
Fig. 3. *Cotugnia* sp.

Results of present study are in agreement with Bhure et. al., 2010 reported high incidence (51.78%), intensity (1.18%) and density (0.613%) of *Rhabdocona* sp. in summer followed by winter and rainy season. Farhaduzzaman et.al., 2010 studied Prevalence of Parasites in the Indian Major Carp, *Labeo rohita* (Hamilton) in Rajshahi, Bangladesh and noticed highest prevalence (75%) and mean density (10.44) of parasites were found in the month of December and lowest (20%) in the month of February.

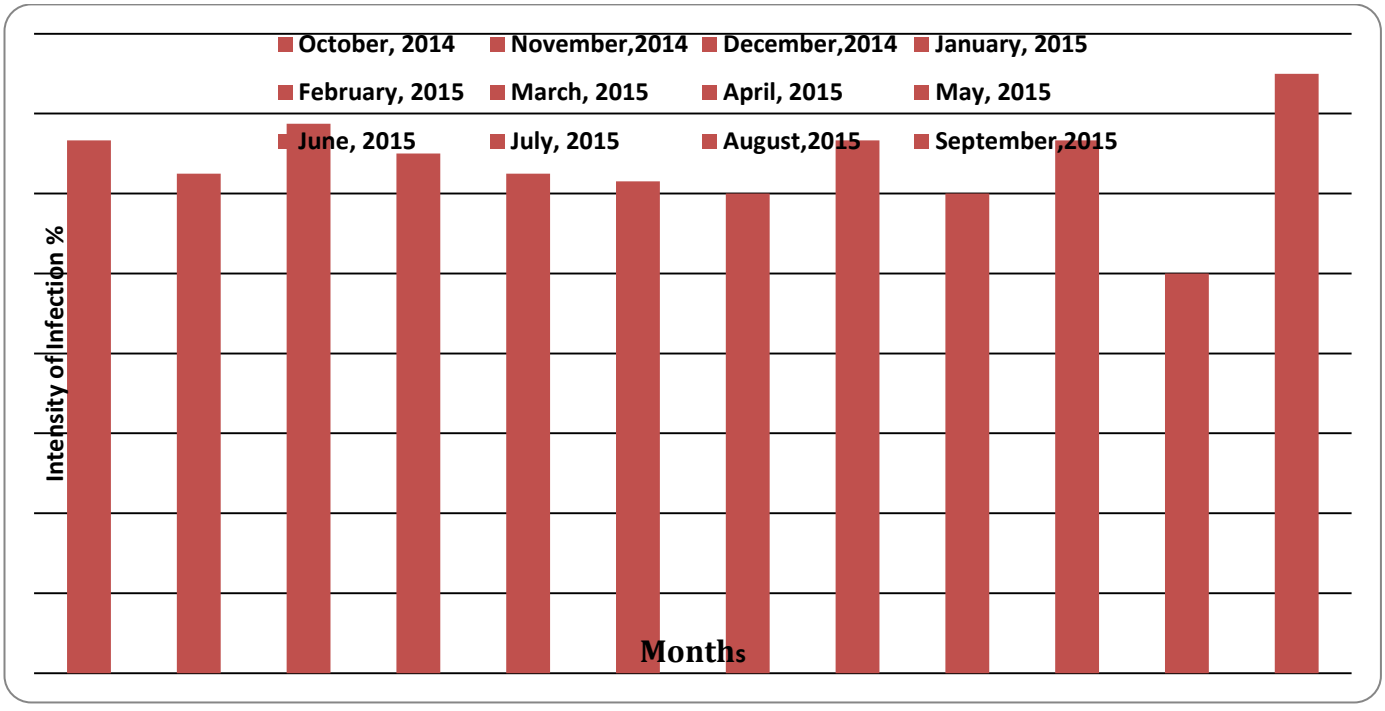
Shahin et.al., 2011 studied prevalence of Chicken Cestodiasis in Egypt and reported highest incidence in summer 5.54% and Autum 5.6% and lowest incidence during Winter 3.3% and Spring 2.2%. Bhure et al., 2013 studied diversity and prevalence of avian cestodes and reported high prevalence in summer where as low in monsoon season. Bhure et.al., 2013 recorded seasonal variation of Caryophyllidean tapeworms, Which showed maximum infection in winter (71.66%) followed by summer (43.33%) whereas lower infection in monsoon (15.00%).

Table 1. Population Dynamics of Cestode *Cotugnia* sp. of Domestic fowl during October, 2014 to September, 2015.

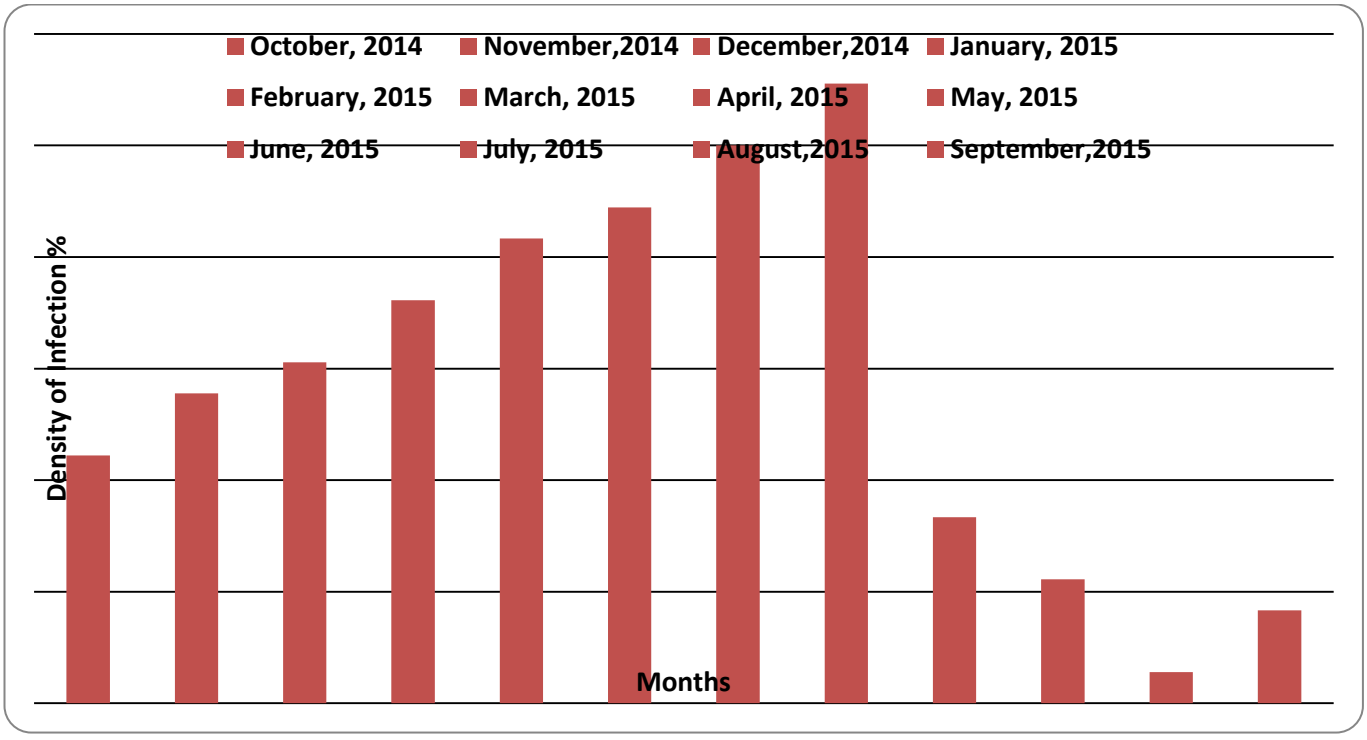
Months	No. of the host Examined	No. of the host Infected	Total No. parasites collected	Incidence %	Intensity %	Density %	Index of infection %
October, 2014	**18**	**06**	**08**	**33.33**	**1.33**	**0.44**	**0.15**
November,2014	**18**	**08**	**10**	**44.44**	**1.25**	**0.55**	**0.25**
December,2014	**18**	**08**	**11**	**44.44**	**1.38**	**0.61**	**0.27**
January, 2015	**18**	**10**	**13**	**55.55**	**1.30**	**0.72**	**0.40**
February, 2015	**18**	**12**	**15**	**66.66**	**1.25**	**0.83**	**0.56**
March, 2015	**18**	**13**	**16**	**72.22**	**1.23**	**0.88**	**0.64**
April, 2015	**18**	**15**	**18**	**83.33**	**1.20**	**1.00**	**0.83**
May, 2015	**18**	**15**	**20**	**83.33**	**1.33**	**1.11**	**0.93**
June, 2015	**18**	**05**	**06**	**27.77**	**1.20**	**0.33**	**0.09**
July, 2015	**18**	**03**	**04**	**16.66**	**1.33**	**0.22**	**0.04**
August,2015	**18**	**01**	**01**	**5.55**	**1.00**	**0.05**	**0.00**
September,2015	**18**	**02**	**03**	**11.11**	**1.50**	**0.16**	**0.02**
Total	**216**	**98**	**125**	**45.37**	**1.28**	**0.58**	**0.26**



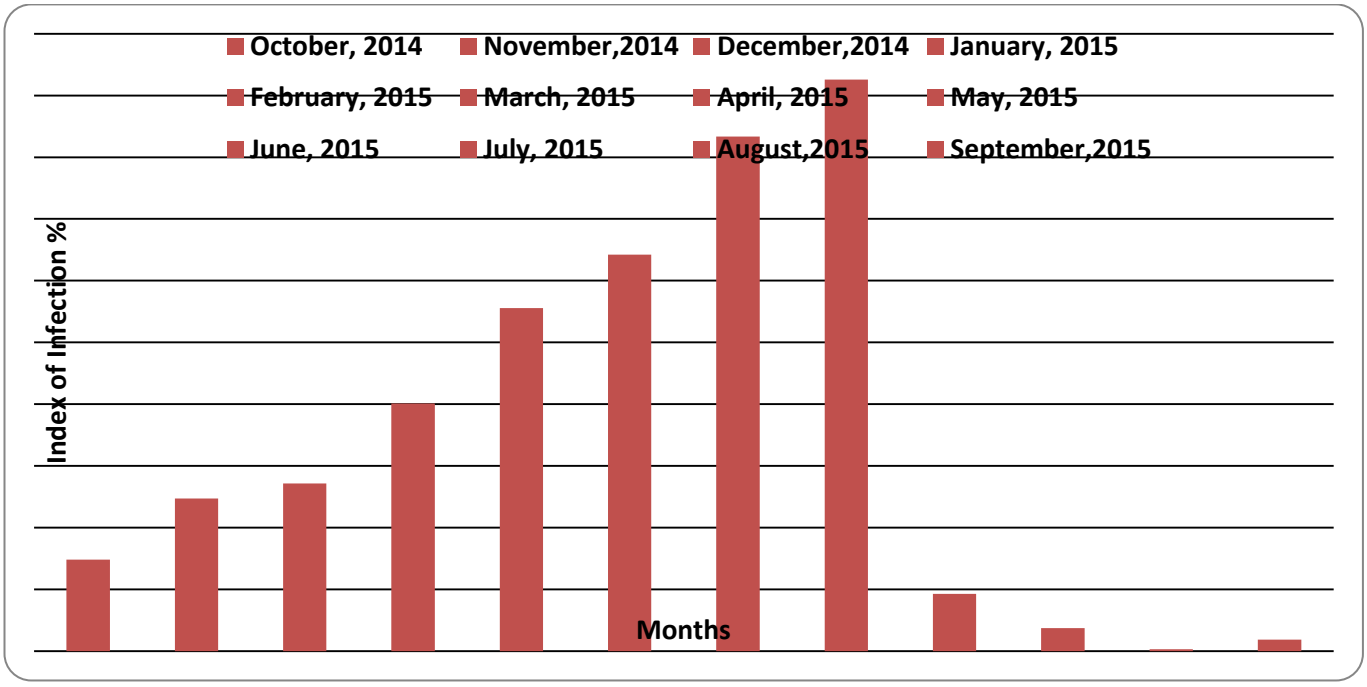
Graph 1. Incidence of infection of Cestode *Cotugnia sp*. of Domestic Fowl during October, 2014 to September, 2015.



Graph 2. Intensity of infection of of Cestode *Cotugnia* sp. of Domestic Fowl during October, 2014 to September, 2015.



Graph 3. Density of infection of of Cestode *Cotugnia sp*. of Domestic Fowl during October, 2014 to September, 2015.



Graph 4. Index of infection of of Cestode *Cotugnia sp*. of Domestic Fowl during October, 2014 to September, 2015.

Bhure and Nanware, 2014 reported high incidence of infection of *Cotugnia dignopora, Cotugnia diamarae* and *Raillietina (R.) domestica* in summer (75%, 67.85 % & 71.42%) followed by winter (60%, 52 % & 48%) whereas low infections in monsoon season (38.09%, 33.33% & 38.09%).Bhure and Nanware, 2014 recorded high incidence of infection of *Senga sp., Gangesia sp., Proteocephalus sp.* infected to *Channa sp.* was in summer (76.66 %, 73.33 % & 70.00 %) followed by winter (65.21 %, 52.17% & 56.52%) whereas infection was low in monsoon (36.84%, 26.31% & 31.57%). Ibraq Khurshid and Fayaz Ahmad 2014 recorded highest prevalence of helminthes in *Schizothorax* sp. during summer and lowest in winter. Bhure et.al., 2014 reported prevalence of helminth parasites of Freshwater fish *Mastacembelus armatus* from Nanded Region and noticed high incidence of infections were recorded in summer (Feb., 2014-May, 2014) followed by winter (Oct., 2013- Jan., 2014) where as low in monsoon (June, 2013 –Sept., 2013). Bhure and Nanware,(2014) described high prevalence of nematode parasites of *Procamallanus hyderabadensis* were occurred in Summer(Feb.,2014-May,2014) was 79.16% followed by Winter(Oct.,2013- Jan., 2014) was 43.75% whereas infection was low in monsoon (June, Sept., 2014) was 37.50%. Nanware et.al., 2015 reported High incidence, Density and Index of infection of Piscean nematode of genus *Camallanus sp.* and *Spinitectus sp.* in Summer followed by Winter whereas infection was low in monsoon. Salam 2015 studied highest load of prevalence of *Ascaridia galli* was found highest in Summer with total of 312 parasites recovered from 56 infected chicken.

Kennedy C.R. (1976) reported temperature; humidity, rainfall, feeding habits of host, availability of infective host and parasite maturation are responsible for influencing the parasitic infections. Feeding activity of the host is reason for seasonal fluctuation of infections (Pennuyuick 1973). Nair and Nadakal, (1981) explained retarded growth, decreased egg production, reduced weight gain, significant haemoglobin depression due to infections of cestode parasites in chickens. Jadhav and Bhure, (2006) noticed high temperature, low rainfall and sufficient moisture ware necessary for development of parasite.

4. CONCLUSION

Recorded data of present study shows high incidence, density and index of infections of *Cotugnia* sp. was in summer followed by winter where as low in monsoon due to environmental factors and feeding habitat influence the seasonality of parasitic infection either directly or indirectly.

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