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Distribution and seasonal dynamics of nematode infections in chickens in different geographical and climatic zones of Uzbekistan

O'zbekistonning turli geografik-iqlim mintaqalarida tovuqlar nematodozlarining tarqalishi va mavsumiy dinamikasi

Распространение и сезонная динамика нематодозов кур в различных географо-климатических зонах Узбекистана

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AUTHOR, TITLE AND ABSTRACT METADATA (EN / UZ / RU)**ENGLISH****Komiljon Shuhrat o'g'li AKRAMOV^{1,*} , Xurshid Abdurajabovich SAFAROV¹ , Behzod Karamat o'g'li ULUQOV¹**¹ Scientific-Research Institute of Veterinary, Samarkand, Uzbekistan

Abstract. This study investigated the prevalence, spatial and seasonal dynamics of major nematode infections among chickens kept in household farms and poultry farms located in different geographical and climatic zones of the Republic of Uzbekistan. The study was conducted in 11 regions of the Republic during 2022–2024, and a total of 1,682 fecal samples were examined using helminthocoprological methods. The study employed the Fulleborn flotation method, the sequential washing method, a modified version of the Berman–Orlov method, as well as complete and incomplete helminthological necropsy methods. According to the results obtained, 779 chickens, or 46.31% of the examined birds, were infected with nematode infections. Among the nematode infections, the prevalence of ascariasis was 25.45%, heterakidosis 28.59%, and capillariasis 26.28%. In terms of geographical and climatic zones, the highest infection rate was recorded in the southern zone at 62.84%, while the lowest rate was observed in the eastern zone at 26.15%. Seasonal analysis showed that the highest infection rate occurred in winter (58.23%), whereas the lowest rate was recorded in spring (28.97%). The findings demonstrate the relevance of organizing control measures against nematode infections in chickens based on preventive strategies that take into account geographical and seasonal risk factors.

Keywords: chicken; nematode infections; ascariasis; heterakidosis; capillariasis; prevalence; geographical and climatic zone; seasonal dynamics

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Annotatsiya. Ushbu tadqiqotda O'zbekiston Respublikasining turli geografik-iqlim mintaqalarida aholi xonadonlari va parrandachilik xo'jaliklarida boqilayotgan tovuqlar orasida asosiy nematodozlarning tarqalish darajasi, hududiy va mavsumiy dinamikasi o'rganildi. Tadqiqotlar 2022–2024-yillarda Respublikaning 11 ta viloyatida olib borilib, jami 1682 ta tezak namunasi gelmintokoprologik usullarda tekshirildi. Tadqiqotlarda Fyulleborn, ketma-ket yuvish, Berman–Orlov usulining takomillashtirilgan varianti hamda to'liq va noto'liq gelmintologik yorib ko'rish usullaridan foydalanildi. Umumiy natijalarga ko'ra, tekshirilgan tovuqlarning 779 tasi, ya'ni 46,31% nematodozlar bilan zararlangan. Nematodozlar orasida askaridnoz 25,45%, geterakidnoz 28,59% va kapillarioz 26,28% ekstenszarlanish ko'rsatkichlarini namoyon qildi. Geografik-iqlim mintaqalari kesimida eng yuqori zararlanish janubiy mintaqada 62,84%, eng past ko'rsatkich esa sharqiy mintaqada 26,15% bo'ldi. Mavsumiy tahlil qish faslida 58,23% bilan eng yuqori, bahorda

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esa 28,97% bilan eng past zararlanish qayd etilganini ko'rsatdi. Tadqiqot natijalari tovuqlar nematodozlariga qarshi kurashni hududiy va mavsumiy xavfga asoslangan profilaktika tamoyillari asosida tashkil etish maqsadga muvofiq ekanligini ko'rsatdi.

Kalit so'zlar: tovuq; nematodoz; askaridiaz; geterakidiaz; kapillarioz; ekstenszararlanish; geografik-iqlim mintaqasi; mavsumiy dinamika

РУССКИЙ

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Аннотация. В настоящем исследовании изучены уровень распространения, территориальная и сезонная динамика основных нематодозов среди кур, содержащихся в личных подсобных хозяйствах населения и птицеводческих хозяйствах различных географо-климатических зон Республики Узбекистан. Исследования проводились в 2022–2024 гг. в 11 областях Республики, при этом всего было исследовано 1682 образца фекалий с использованием гельминтокопрологических методов. В исследованиях применяли методы Фюллеборна, последовательного промывания, усовершенствованный вариант метода Берманна–Орлова, а также методы полного и неполного гельминтологического вскрытия. Согласно полученным результатам, из числа исследованных кур 779, или 46,31%, были заражены нематодозами. Среди нематодозов экстенсивность инвазии при аскаридозе составила 25,45%, гетеракидозе – 28,59%, капилляриозе – 26,28%. В разрезе географо-климатических зон наиболее высокий уровень заражённости отмечен в южной зоне – 62,84%, а наиболее низкий – в восточной зоне – 26,15%. Сезонный анализ показал, что наиболее высокий уровень заражённости регистрировался в зимний период – 58,23%, тогда как наиболее низкий показатель отмечен весной – 28,97%. Полученные результаты свидетельствуют о целесообразности организации борьбы с нематодозами кур на основе принципов профилактики, учитывающих территориальный и сезонный риск.

Ключевые слова: курица; нематодозы; аскаридоз; гетеракидоз; капилляриоз; экстенсивность инвазии; географо-климатическая зона; сезонная динамика

1. KIRISH

Introduction

Mavzuning dolzarbligi. Parrandachilik aholini yuqori biologik qiymatga ega bo'lgan oqsil mahsulotlari bilan ta'minlashda muhim o'rin tutadi. Shu bilan birga, parrandalarning mahsuldorligi va saqlanish ko'rsatkichlariga salbiy ta'sir qiluvchi parazitlar kasalliklar, xususan, nematodozlar parrandachilikning iqtisodiy samaradorligini cheklovchi omillardan biri hisoblanadi. Nematodalar tovuqlarning turli a'zolari va to'qimalarida, ayniqsa, hazm qilish tizimida parazitlik qilib, oziq moddalarning o'zlashtirilishini buzishi, organizmning fiziologik holatiga salbiy ta'sir ko'rsatishi va mahsuldorlikning pasayishiga sabab bo'lishi mumkin. O'tkazilgan tadqiqotlar natijalarida keltirilgan ma'lumotlarga ko'ra, tovuqlar nematodozlar bilan zararlanish O'zbekiston hududlarida 24,13–58,04% oralig'ida qayd etilgan.

Xalqaro tadqiqotlarda ham tovuqlarda gelmintozlarning keng tarqalganligi qayd etilgan. Xususan, Shifaw va hammualliflarning tizimli sharhi va tahlilida turli hududlarda xonadonlarda va yerda saqlanadigan tovuqlarda gelmintozlar bilan zararlanishning yuqori darajasi ko'rsatilgan.

O'zbekiston sharoitida tovuqlarning nematodozlari bo'yicha hududiy tadqiqotlar olib borilgan bo'lsa-da, respublikaning bir nechta geografik-iqlim mintaqalarini qamrab olgan holda nematodozlarning tarqalishi, mavsumiy dinamikasi va davolash-profilaktika samaradorligini yagona tadqiqot tizimida baholash amaliy ahamiyatga ega. Mazkur tadqiqotning asosiy vazifalari turli hududlarda askaridiaz, geterakidiaz va kapillariozning tarqalishini aniqlash, ularning mavsumiy dinamikasini baholash hamda optimal profilaktika muddatlarini asoslashdan iborat bo'lgan.

Tadqiqotlar davomida nematodozlarning faqat umumiy tarqalish darajasini aniqlash bilan cheklanmasdan, hududiy xavf darajasi + mavsumiy dinamika o'rtasidagi amaliy bog'liqlikni aniqlashga qaratilgan.

2. TADQIQOT MATERIALLARI VA METODLARI

Materials and methods

Tadqiqot materiallari va metodlari. Tadqiqotlar 2022–2024-yillarda O'zbekiston Respublikasining Andijon, Buxoro, Jizzax, Qashqadaryo, Navoiy, Namangan, Samarqand, Sirdaryo, Surxondaryo, Farg'ona va Xorazm viloyatlarining ayrim tumanlarida olib borildi. Tadqiqot obyekt sifatida parrandachilik xo'jaliklari, shaxsiy yordamchi xo'jaliklar va aholi xonadonlarida boqilayotgan turli yoshdagi, asosan yerda saqlanadigan tovuqlar olindi.

Tadqiqot davomida jami 1682 ta tezak namunasi olindi. Namunalar gelmintokoprologik tekshiruvlardan o'tkazilib, nematodalar tuxumlarini aniqlash va differensial diagnostika qilishda Fyulleborn hamda ketma-ket yuvish usullaridan foydalanildi. Nematodalarning intensivligini aniqlashda K.I.Skryabinning to'liq va noto'liq gelmintologik yorib ko'rish usullari qo'llanildi.

Tadqiqot hududlari geografik-iqlim xususiyatlariga ko'ra sharqiy, markaziy, janubiy, janubiy-g'arbiy va g'arbiy mintaqalarga ajratib tahlil qilindi.

Nematodozlarning ekstenszararlanish ko'rsatkichi quyidagi formula asosida baholandi:

$$EZ = n / N \times 100 \quad (1)$$

bu yerda:

EZ – ekstenszararlanish, %;

n – zararlangan tovuqlar soni;

N – tekshirilgan tovuqlarning umumiy soni.

3. TADQIQOTLAR NATIJALARI VA TAHLILLAR

Results and discussion

Tadqiqotlar natijalari va tahlillar. Tadqiqotlar natijasida O'zbekistonning 11 ta viloyatida tekshirilgan 1682 ta namunadan

779 tasida nematodoz qo'zg'atuvchilari aniqlanib, umumiy ekstenszararlanish 46,31% ni tashkil etdi. Mazkur ko'rsatkich tovuqlarda nematodozlarning Respublika miqyosida keng tarqalganligini va ularni nazorat qilishni tizimli ravishda tashkil etish zarurligini ko'rsatadi.

Nematodozlarning alohida turlari bo'yicha geterakidoz nisbatan yuqori tarqalish ko'rsatkichiga ega bo'lib, 481 ta namunada yoki 28,59% da aniqlandi. Askaridioz 428 ta namunada (25,45%), kapillarioz esa 442 ta namunada (26,28%) qayd etildi.

Mazkur natijalar nematodozlarning ko'pincha yakka holda emas, balki aralash invaziya shaklida uchrashini ko'rsatadi. Shu sababli faqat bitta gelmint turiga yo'naltirilgan profilaktika strategiyasi o'rniga asosiy nematodozlarning kompleks nazoratini nazarda tutuvchi yondashuv muhim hisoblanadi.

1-jadval

Nematodozlarning tarqalish darajasi geografik-iqlim mintaqalariga ko'ra / **Table 1.** Prevalence of nematode infections by geographical and climatic zone

Geografik-iqlim mintaqasi	Tekshirilgan namuna	Zararlangan	Ekstenszararlani sh
Sharqiy	390	102	26,15%
Markaziy	747	389	52,07%
Janubiy	183	115	62,84%
Janubiy-g'arbiy	168	79	47,02%
G'arbiy	194	94	48,45%

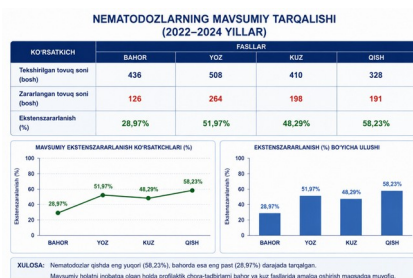
1-jadval ma'lumotlariga ko'ra, eng yuqori zararlanish janubiy geografik-iqlim mintaqasida – 62,84%, eng past ko'rsatkich esa sharqiy mintaqada – 26,15% qayd etildi. Markaziy mintaqada zararlanish 52,07%, janubiy-g'arbiy mintaqada 47,02% va g'arbiy mintaqada 48,45% ni tashkil etdi.

Janubiy mintaqadagi yuqori ko'rsatkich, xususan, Qashqadaryo viloyatining Kitob tumanida qayd etilgan 75,0% ekstenszararlanish bilan tavsiflanadi. Surxondaryo viloyatida esa ushbu ko'rsatkich 58,51% ni tashkil etgan.

Markaziy mintaqada ham nematodozlar muhim epizootologik ahamiyatga ega bo'lib, 747 ta tekshirilgan namunadan 389 tasida, ya'ni 52,07% da nematodozlar aniqlangan. Samarqand viloyatida umumiy zararlanish 58,57%, Sirdaryoda 50,58% va Jizzaxda 41,91% ni tashkil etgan.

Ushbu natijalar nematodozlarning tarqalishini hududlar bo'yicha bir xil deb baholash mumkin emasligini ko'rsatadi. Aksincha, profilaktika tadbirlarini hududning epizootologik xavf darajasidan kelib chiqib differensial tashkil etish maqsadga muvofiq.

Nematodozlarning mavsumiy tarqalishi ham aniq farqlarni namoyon qildi. 2022–2024-yillardagi kuzatuvlar davomida bahorda 436 bosh tovuqdan 126 tasida, yozda 508 boshdan 264 tasida, kuzda 410 boshdan 198 tasida va qishda 328 boshdan 191 tasida nematodozlar aniqlangan (1-rasm).



1-rasm. Nematodozlar bilan zararlanishning mavsumiy dinamikasi / **Fig. 1.** Seasonal dynamics of infection with nematode infections

Demak, qish mavsumida aniqlangan zararlanish bahor mavsumiga nisbatan qariyb ikki baravar yuqori bo'ldi.

Mavsumiy dinamikaning bunday xususiyati tashqi muhit sharoitlari, parazit tuxumlarining tashqi muhitda saqlanishi va tovuqlarning saqlash sharoitlari bilan bog'liq bo'lishi mumkin. Tadqiqot materiallarida parazitlarning biologik rivojlanishi va tashqi muhit omillari nematodozlarning mavsumiy o'zgarishida muhim omil sifatida qayd etilgan.

Shu asosda, bahor va kuz fasllarida rejalashtirilgan degelmintizatsiya tadbirlarini tashkil etish epizootologik jihatdan maqsadga muvofiq deb hisoblaymiz.

Tadqiqotlar natijalariga asosan O'zbekiston hududida tovuqlar nematodozlarining tarqalishi hududiy va mavsumiy jihatdan bir xil emasligi qayd etildi. Umumiy 46,31% zararlanish ko'rsatkichi nematodozlar aholi xonadonlarida boqiladigan tovuqlar orasida asosiy gelmintoz muammo ekanligini ko'rsatdi. Ayniqsa, janubiy mintaqada qayd etilgan 62,84% va markaziy mintaqadagi 52,07% ko'rsatkichlar yuqori xavfli hududlarni ajratib ko'rsatish imkonini berdi.

Nematodozlarning alohida turlari orasida geterakidozning 28,59% bilan nisbatan yuqori ko'rsatkichga ega bo'lishi uning hududiy profilaktika dasturlarida alohida e'tiborga olinishi zarurligini ko'rsatdi. Askaridioz va kapillarioz ham mos ravishda 25,45% va 26,28% zararlanish darajasi aniqlandi.

Mavsumiy tahlil natijalari qish va yoz oylarida yuqori zararlanish qayd etilishini ko'rsatdi. Qishdagi 58,23% ko'rsatkich tovuqlarning yopiq yoki cheklangan sharoitda saqlanishi, sanitariya-gigiyena holatining yomonlashishi va invazion materialning to'planishi bilan bog'liqligi aniqlandi.

4. XULOSALAR

Conclusions

O'zbekistonning 11 ta viloyatida 2022–2024-yillarda o'tkazilgan tadqiqotlar natijasida tovuqlar nematodozlari keng tarqalgan parazitlar kasalliklardan biri ekanligi aniqlandi. Jami 1682 ta tekshirilgan namunadan 779 tasida nematodozlar aniqlanib, umumiy ekstenszararlanish 46,31% ni tashkil etdi.

Geografik-iqlim mintaqalari bo'yicha eng yuqori zararlanish janubiy mintaqada (62,84%), eng past zararlanish sharqiy mintaqada (26,15%) qayd etildi. Markaziy mintaqada 52,07%, janubiy-g'arbiy mintaqada 47,02% va g'arbiy mintaqada 48,45% zararlanish aniqlandi.

Nematodozlarning asosiy shakllari orasida geterakidoz (28,59%), kapillarioz (26,28%) va askaridioz (25,45%) qayd etildi.

Mavsumiy dinamika bo'yicha eng yuqori zararlanish qishda (58,23%), undan keyin yozda (51,97%) va kuzda (48,29%) qayd etilgan bo'lsa, bahorda eng past ko'rsatkich (28,97%) kuzatildi.

DECLARATIONS

Declarations

Author contributions CRediT

Conceptualization; Methodology; Investigation; Data curation; Writing – original draft; Writing – review & editing. All authors have read and agreed to the published version of the manuscript.

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Ethics approval

Not applicable. This study did not involve humans, animals or other regulated materials.

Informed consent

All authors have read and approved the final version of the manuscript and have given their consent to its submission and publication. The study involved no human participants and no personal data.

Data availability statement

All data supporting the findings of this study are presented in the article and are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare no conflict of interest.

Generative AI disclosure

Generative AI was used only partially. The authors used Claude (Anthropic, Opus 5) for language editing, formatting of the reference list and preparation of the English and Russian metadata. No text, data, figures or conclusions were generated by AI. The authors reviewed and verified all output and take full responsibility for the content of the publication.

EXTENDED SUMMARY IN ENGLISH

Kengaytirilgan inglizcha xulosa / Расширенный реферат на английском языке

Mandatory for all articles whose full text is not in English. Length 600–1000 words. It must be independently readable: a reader who does not know the language of the full text should understand the problem, the method, the numerical results and the contribution without consulting the main text. Do not copy the 250-word abstract.

Purpose and research problem

Poultry farming is one of the fastest routes to supplying the population with protein of high biological value, and its efficiency depends directly on the parasitological well-being of the flock. International studies, among them the systematic review by Shifaw and co-authors, have documented the wide distribution of helminth infections in chickens. Regional studies of chicken nematodoses have been carried out in Uzbekistan, but the country as a whole had not been surveyed on a single methodology, so that the relative risk of the different geographical and climatic zones could not be compared. The study was designed not merely to establish the overall prevalence of nematodoses, but to determine the level of territorial risk and the seasonal dynamics of infection, since these are what determine when and where deworming should be planned.

Materials and methods

The investigations were carried out in 2022–2024 in eleven regions of the Republic of Uzbekistan, including Andijan, Bukhara and Jizzakh among others, on chickens kept both in household holdings and on poultry farms. A total of 1682 faecal samples were collected and subjected to helminthocoprological examination for the presence of nematode eggs. The methods used were the Fülleborn technique, successive washing, an improved variant of the Baermann–Orlov method, and complete and incomplete helminthological dissection. The study areas were grouped by their geographical and climatic characteristics into eastern, central, southern, south-western and western zones. The prevalence of infection was calculated as $EZ = n / N \times 100$, where EZ is the prevalence in per cent, n the number of infected chickens and N the total number of chickens examined.

Results and discussion

Of the 1682 samples examined in eleven regions, 779, that is 46.31 %, were positive for nematode infection. Among the individual infections heterakidosis had the relatively highest prevalence, being detected in 481 samples and giving 28.59 %, followed by capillariosis at 26.28 % and ascaridiosis at 25.45 %; since the sum of the individual figures exceeds the overall prevalence, the infections evidently occur not in isolation but frequently as mixed invasions. By geographical and climatic zone, presented in Table 1, the highest infection was recorded in the southern zone at 62.84 % and the lowest in the eastern zone at 26.15 %. The high southern figure is illustrated in particular by the 75.0 % prevalence recorded in Kitab district of Kashkadarya region. The central zone also proved epizootologically important, with 389 of 747 samples examined found positive. These results show that the

distribution of nematodoses cannot be regarded as uniform across the country; on the contrary, it is markedly zonal. The seasonal analysis, shown in Figure 1, revealed equally clear differences: infection reached 58.23 % in winter, 51.97 % in summer and 48.29 % in autumn, so that the winter figure was almost twice that recorded in spring. This pattern is attributable to the external environmental conditions, the survival of parasite eggs in the environment and the management of the birds, and it implies that planned deworming should be organised for the spring and autumn seasons.

Conclusion and contribution

The investigations carried out in eleven regions of Uzbekistan in 2022–2024 established that nematodoses of chickens are widely distributed, with an overall prevalence of 46.31 % among the 1682 samples examined. By geographical and climatic zone the highest infection was recorded in the southern zone (62.84 %) and the lowest in the eastern zone (26.15 %). Among the principal forms, heterakidosis (28.59 %), capillariosis (26.28 %) and ascaridiosis (25.45 %) were recorded. The seasonal dynamics showed the highest infection in winter (58.23 %), followed by summer (51.97 %) and autumn (48.29 %). The contribution of the work is the first country-wide, single-methodology assessment of chicken nematodoses in Uzbekistan resolved by both zone and season, which converts a general awareness of the problem into a concrete basis for planning zonal and seasonal deworming programmes.

ADABIYOTLAR RO'YXATI

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