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# Astudy of prevalence of intestinal parasitic infections among the Patients Attending medical laboratory of Toulmetha Hospital inToulmetha District, Northeastern Libya

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## Abstract

Intestinal parasites are the causative agents of common infections with substantial public health problems in several developing countries than elsewhere in the world, and Libya as well as. There is no data related to occurrence of intestinal parasite from Toulmetha district,therefore,the present study aimed to identify and evaluate the prevalence of the intestinal parasites among the patients was attending to medical laboratory of Toulmetha Hospital. Data was collected from the clinical laboratory, where records from laboratory information system (LIS) software, during the period from the first of July2021 till the end of Aguste2022.The study involved 107cases(67males and40 females). Patients ranged in age from ≤10 years to≥50years. All stool samples were subjected to fecal examination using direct smear measure(saline &Lugol's iodine wet mount).Data were analyzed by SPSS software, and ($\chi 2$) test were used for evaluation the results. The statistically significant differences were measured at level $p<0.01$.A total of 107 stool samples were examined out of 88 samples were infected with parasites, which represent 82.2%.The difference were noted between male and female infection rate, where the percentage of males(51.4%)and females (30.8%),with no significant differences in the prevalence between them ($p>0.01$).Sex types of intestinal parasites were detected, Helminthes percentage of infection were(73.8%)significantly more than protozoa with(8.4%).The most commonly observed parasite was *Enterobius vermicularis*was56(52.3%)of the cases, followed by *Entamoeba coli* and *Entamoebahistolytica/dispar* with similar infection rates(6.5% and 6.5%%),respectively, and *Hymenolepis nana* cases and *Ascaris lumbricoides* with similar infection rates (5.6%,5.6%) respectively, While the low rate was *Giardia lamblia*with 4(3.7%).Also indicate that the mono-parasitism infection pattern was the most common compared to the bi-parasitism infections,80.2%,and1.8%respectively.The prevalence of *E.histolytica/dispar, G.lamblia* was 0.9%,and *E.vermicularis*,*E. histolytica /dispar* was 0.9%.Regarding age groups, The highest prevalence of infection was47.7%,and recorded among the first age group(≤10 years old),the second age group(from11-20 years old) with a percentage of 25.2%,while the lowest rate was in the group(≥ 51 years old)by 0.9%,without significant relationship between the infection and ages ($p>0.01$).Based on the seasonal variation, the highest prevalence rates were recorded in A quest and July with similar infection rates(15.0%,15.0%) respectively, Whereas the lowest rate was0.9%in December, with significant differences between the prevalence rates in different months($p<0.01$).This study demonstrated the highest prevalence of intestinal parasitic infection was 82.2% in Toulmetha district, especially between the children. The proportion of infections was higher for helminthes compared to protozoa. Attention should be given to promoting personal hygiene, environmental sanitation, health education, and availability of potable water are essential, as well as routine medical examination, effective treatment and management program to reduce the prevalence of infection in this area.

**Keywords:**Protozoa**,**Helminthes,intestinalparasites;Prevalence;Toulmethadistrict .

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**الملخص:-**

الإصابة بالطفيليات المعوية الناتجة عن الأوليات والديدان الطفيلية من أهم المشاكل الصحية على مستوى العالم ،ولا سيما في الدول النامي مثل ليبيا.لاتوجد معلومات عن دراسات سابقه حول معرفة معدل انتشار هذه الطفيليات في منطقه الدراسة الحالية،لذا هدفت الدراسة إلى معرفة الأنواع وتقدير معدل انتشار الطفيليات المعوية بين المرضى المترددين على المختبر الطبي بمستشفى طلميثه القروي.تم تجميع البيانات من سجلات المختبر الطبي بالمستشفى خلال الفترة ما بين شهريوليو2021الى شهر أغسطس2022م.خلال هذه الفترة فحصت 107 عينة براز(67 ذكورو40 إناث)،تراوحت أعمارهم مابين(اقل من 10 سنوات واكبر من 50سنه).خضعت العينات للفحوص الروتينية المتبعة بالفحص العيانى والميكروسكوبي بالمسحة المباشرة باستخدام المحلول الملحي(0.9 %)ومحلول الايودين(0.5%).عولجت البيانات المجمعة إحصائيا باستخدام برنامج (SPSS)،واختبار مربع كاى($\chi 2$).بينت النتائج أن عدد المصابين بالطفيليات المعوية بلغ 88 عينة اى بنسبة(82%)،وكانت نسبة إصابة الذكور أعلى من الإناث 67(51.4%)و40(30.8%)على التوالي،كما أوضحت إن نسبة الاصابه بالديدان الطفيلية كانت الأعلى من الأوليات الطفيلية 63.9%, 18.05%) على التوالي.بينت النتائج وجود 6 أنواع من الطفيليات المعوية وهى:الديدان ألدبوسيه *E.vermiculars*،والتي كانت الأكثر شيوعا بنسبة(52.3%),يليها طفيلي الانتاميبا القولونية *E.coli* والانتاميبا الحالة للنسج/المتغايره *E. Histolytic a/dispar* بنسبة متماثلة(6.5%),ديدان المحرشفة القزمة H.nan،وديدان الإسكارس *A.lumbricoides* بنسبة متماثلة(5.6%),واقلها معدل أصابه بطفيلي الجيارديا لامبيلا *G.lamblia* (3.7%)،كما بينت نتائج الدراسة الحالية إن نمط الاصابه الفردية بالطفيليات كان هو الأكثر شيوعا مقارنتا بنمط الاصابه المزدوجة بنسبة(80.2%و1.8%)على التوالي.سجلت نسبة الإصابة المزدوجة بين الانتاميبا الحالة للنسج/المتغايره والجيارديا لامبيلا(0.9%)،والدودة ألدبوسيه مع الانتاميبا الحالة للنسج/المتغايره أيضا(0.9%).فيما يتعلق بمعدل الاصابه وعلاقتها بالعمر,كانت أعلى معدل أصابه بالطفيليات المعوية بين الأعمار(≥10سنه)هي الأعلى(47%),وأدنى معدل أصابه بين الأعمار(≤50سنه)حيث سجلت(0.9%).كما أظهرت نتائج الدراسة الحالية نسبة أصابه بالطفيليات المعوية خلال شهر أغطس بنسبة(15.0%),واقل معدل خلال شهر ديسمبر(0.9%)مع وجود فروق معنوية($p<0.01$).أظهرت نتائج الدراسة ارتفاع عالي في معدل الإصابة بالطفيليات المعوية،وخاصة بين الأطفال.لذالك يوصى بالاهتمام بالوضع البيئي والصحي وتوعية أفراد المجتمع والكشف الطبي الدوري والعلاج لتقليل من انتشار الاصابة بالطفيليات المعوية في منطقة الدراسة.

الكلمات المفتاحية :الأوليات،الديدان،الطفيليات المعوية،الانتشار،منطقة طلميثة.

## Introduction:-

Intestinal parasitic infection caused by intestinal helminthes and protozoan parasites are one of the major health problems worldwide, particularly in tropics and subtropics countries than elsewhere in the world, where they cause more clinical morbidity and mortality than other infectious diseases[Taghipour *et al*.,2021andAhmad,2023].Evaluating the prevalence of intestinal parasites and potential risk factors in different localities is important to enhance control strategies[Hailu&Ayele.,2021].The prevalence of protozoan and helminthes infections may be attributed to many including: poor environmental conditions and personal hygiene, an inadequate supply of drinking water, and a waste disposal system which did not correspond with the approved standards[Ayalew *et al*,2011].Among intestinal protozoan parasites,*Entamoeba histolytica* and *Giardia lamblia* are the predominant sources of infections in the human population[Hemphill *et al*.,2019 and Sutrave& Richter,2021],as well as helminthes like *Ascaris lumbricoides*, and *Enterobius vermin cularis* are frequently occurring intestinal parasites that cause a significant amount of morbidity in both children and adult populations[(Khan *et al*.,2023].The enterobiosis has been estimated that approximately200million cases infected worldwide, and over 30%of cases are children age 5 to 10 years[Boas *et al.,*2012].Current assessments suggest that at least one third of the total population in the worlds infected with intestinal parasites, the number of people infected is currently estimated that nearly of 3.5 billion people globally at least one species of intestinal parasite, leading to over450million illnesses every

year[WHO,2006,andShiferaw *et al*.,2021].Among intestinal protozoan parasites:*Entamoeba histolytica/dispar, Giardia intestinal is, Ascaris lumbricoides,* and hookworm*,* are among the most common parasites in the world, where more than 980 million people are infected by *A.lumbricoides,* 700–900 million Hookworm infections,200million *Giardia intestinalis,*and500 million *E. histolytica/dispar* cases globally[(WHO,1996].As well, the protozoa*E.histolytica* and *G. lamblia* infect about half a billion individuals worldwide[Ouattara *et al*.,2010].The prevalence of the intestinal parasites varies from one country to another or even within the same country and depend up on low socio-economic status, lack of pure water supply, inadequate sanitation, unhygienic condition, as well as education of local people, Additional depends upon the same factors contribute to the transmission of intestinal parasites, where parasitic infections can occur from eating contaminated water, raw vegetables and fruits, soil-eating behavior[Yimam *et al*.,2020,andKarima *et al*.,2022].Several studies reported varied rate of intestinal parasite infection, due to its importance for public health, and showed its high prevalence in developing countries especially children[Ulukanligil&Seyrek,2004;Graczy *et al*.,2005;Kassem *et al* .,2007;and Aly& Mostafa, 2010].Both*G.lambila, E.histolytica, E.coli,A.lumbricoides,E.vermicularis ,and H.nana* are frequently transmitted by contaminated food and/or drinking water, as well as potentially spread from person to person through fecal oral contact[Bahmani *et al*.,2017].The symptomatic infection manifests as diarrhea, abdominal discomfort, and malabsorption, anemia, resulting in malnutrition, weight reduction, and impaired growth and mental development especially in children[Oninla *et al*.,2010andEllwangeret *et al*.,2022].This the symptoms lead to a direct effect on public health, body immunity and disease resistance, especially in children and families with limited income, where children are more likely to be infected with intestinal parasites and leads to nutritional deficiency, anemia, abdominal colic, growth retardation, and impaired learning ability [Baragundi *et al*.,2011].The diagnosis of Intestinal parasitic infections is done by both clinical and laboratory analysis. Clinical diagnosis is based on several symptoms and laboratory diagnosis is done by processing the fresh stool sample with the direct microscopic technique to detect cysts, trophozoites, eggs and larva of intestinal parasites immediately[(Karima *et al*., 2022].Treatment is given with various anti-parasitic agents. However, appropriate preventive measures are essential for successfully controlling. No recent data are available on the prevalence of prevalence of intestinal parasitic infections in the city of Toulmetha,Our study is the first .Therefore, aim of this study was to investigate the type and prevalence of intestinal parasitic infection among patients visiting the medical laboratory of the Toulmetha District hospital, and the prevalence of the intestinal parasitic diseases by year, age and gender .As well as, the results of this study might help in strengthening the information available so far, and will help of drawing a geographic intestinal map of distribution parasite in different regions.

## Materials and Method:-

### Study area: -

Toulmetha district consists of scattered residential sectors and farms, this region is located on the Mediterranean coast, North east Libya ,and 20 Km north of Al-Marge City east Libya, located at (N,20.941722°, E, 32.701287$^0$,and between sea, mount and forests, with an average of population 140.000,Most of individual were active farmers and livestock breeders. This area has Mediterranean climate with moderate winter and hot summer, with the relative humidity. The average monthly temperature during the

winter reach to$10^0$C,and may reach to $41^0$Cin the summer. The records of the laboratory results were examined, analyzed and checked.

**Study design and population:-**

In this retrospective study data was collected from the clinical laboratory of Toulmetha district Hospital. The results of 107 stool samples recorded between July/2021 to A quest/2022from laboratory information system (LIS)software of patients(children and adults),who attended clinical laboratory. Patients were distributed into six groups according to their age (≤10,11-20,21-30, 31-40,41-50, ≥50), and gender (Male & female).

**Stool Sample Processing:** -

**Sample Collection and Parasitological Diagnosis: -**

All 107 patients were referred for stool examination by clinical laboratory staff at Toulmetha Hospital. The stool specimens were collected in sterile plastic containers, and labeled appropriately with patients' names, sex, time and date of collection, and all fecal samples were subjected to the routine methods used for the stool sample examinations were:

**Macroscopic examination: -**

Macroscopic examination of stools were recorded included color, consistency,textures,and presence of mucous, serous, greasy, blood, and presence of egg, Larvae or/and adult intestinal worms.

**Microscopic examination: -**

Direct wet mount of stool in saline(0.9%), and stained with Lugol's iodine followed by the examined under a light microscope using, tow wet mount preparations were a small amount of specimen about 2 mg of stool was taken by a wooden applicator from both the surface and the inside of the specimen, then were made on clean glass slide, and emulsified mixed with a drop of physiological saline .For the other preparation, the specimen was emulsified with Lugol's iodine solution, and covered with a cover slip. Slides were viewed at 10x&40x magnification for detecting protozoan trophozoite or/and cysts, as well as larvae ,ova and adults helminthes were all recorded(WHO,1991).Parasitological assessment was performed by qualified laboratory technologists, and the results were carefully recorded in tables.

## Statistical analysis: -

Data were recorded from laboratory and entered in to a Microsoft Excel data base and analyzed using the Statistical Package for Social (SPSS, version 23) for analysis. Descriptive statistics were used for calculating the frequency and percentage of both dependent and independent variables. The Chi-square($\chi 2$)test was performed to corroborate the possible association between the prevalence of Intestinal parasitic infection and variables such as sex, age, type of infection and monthly. A p-value less than<0.01 was considered to be statistically significant.

## Results:-

**Prevalence of intestinal parasite infections: -**

In the present study demonstrated that the prevalence of intestinal parasitic infection 88(82.2%)among a total of 107 stool samples, while 19(17.8%) were free of any parasite(Table1& Figure1),and the overall rates of intestinal Parasitic Infections are more prevalent in Males55(51.4%)and was comparatively less prevalent in females33(30.8%),with no significant statistically differences in the distribution of intestinal parasites infection between males and females(P>0.01).(Table2,Figure2)

Table:(1).Prevalence of intestinal parasitic infection in the study population

| No. of cases | No. of infection | (%) | No. of non infection | (%) |
|---|---|---|---|---|
| 107 | 88 | 82.2% | 19 | 17.8% |

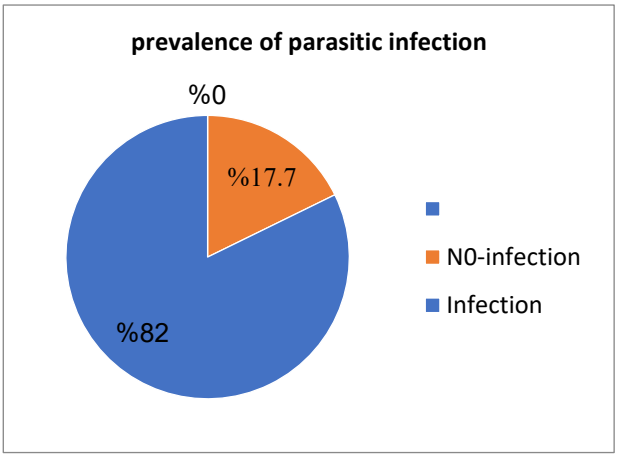



Figure:(1).Prevalence of intestinal parasitic infection in the study population.

Table:(2).Distribution of parasitic infection of patients in different gender:

| Gender | Male | | Female | | Total | |
|---|---|---|---|---|---|---|
| | No. of positive sample (%) | No. of negative sample (%) | No. of positive sample (%) | No. of negative sample (%) | No. of positive sample (%) | No. of negative sample (% |
| | 55(51.4%) | 12(11.2%) | 33(30.8%) | 7(6.5%) | 88(82.2%) | 19(17.8% |

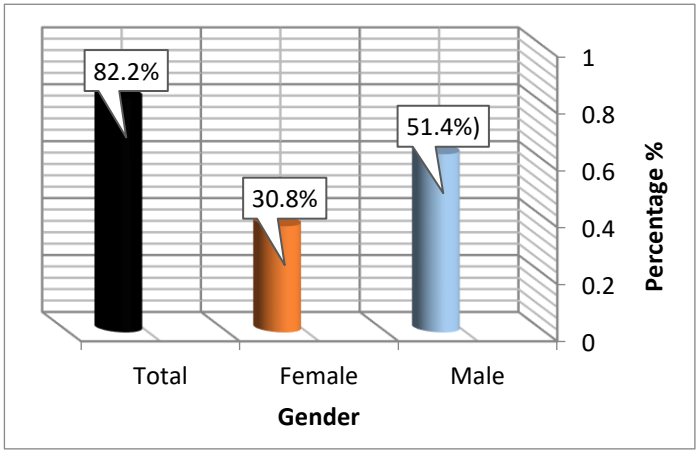



Figure:(2).Gender wise distribution intestinal parasitic infection in positive case

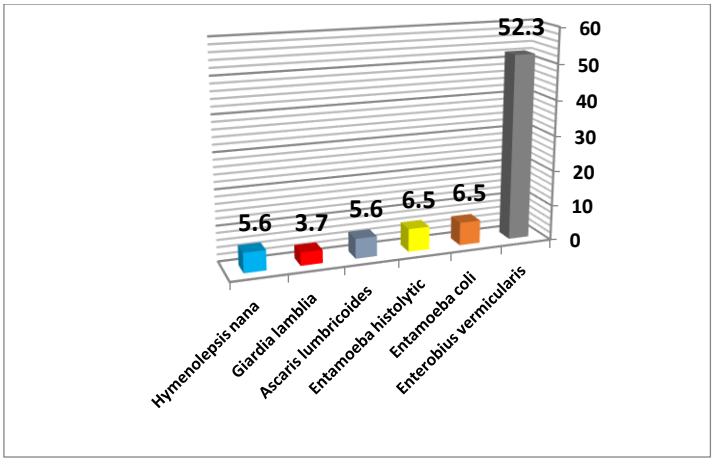
**Distribution of intestinal parasite prevalence and types of infections:**

A total of 107 stool samples were examined out of which 88 revealed presence of parasites with a prevalence rate of (82.2%)cases, and the rate of intestinal infection, for Helminthes

were(80.2%) significantly more than protozoa with(1.8%).Among positive samples, the most prevalent specie was *Entamoeba histolytica,* which, was 56(52.3%) cases, followed by *Entamoeba histolytica/dispar and Entamoeba coli* with similar infection rates 7(6.5% and 6.5%)respectively,*Hymenolepis nana* and *Ascaris lumbricoides* with similar infection rates 6(5.6% and 5.6%, respectively,and the lowest infection *Giardia lamblia* with 4 positive cases(3.7%). It was noted that the infection type with a single parasite was seen more in patients(80.3%)when compared to double type of infections (1.8%).(Table 3,Figure 3,4)

Table:(3).Distribution of various parasites and type of infection in positive cases.

| Variable | No. of samples positive | Percentage (%) |
|---|---|---|
| Type of parasite species | | |
| *Enterobius vermicularis* | 56 | 52.3 |
| *Entamoeba coli* | 7 | 6.5 |
| *Entamoeba histolytic* | 7 | 6.5 |
| *Ascaris lumbricoides* | 6 | 5.6 |
| *Hymenolepsis nana* | 6 | 5.6 |
| *Giardia lamblia* | 4 | 3.7 |
| Infection pattern | | |
| Mono-parasitism | 86 | 80.2% |
| Bi-parasitism | 2 | 1.8% |
| Total | 88 | 82.2% |




Figure(3):Distribution of various parasites and type of infection in positive cases.

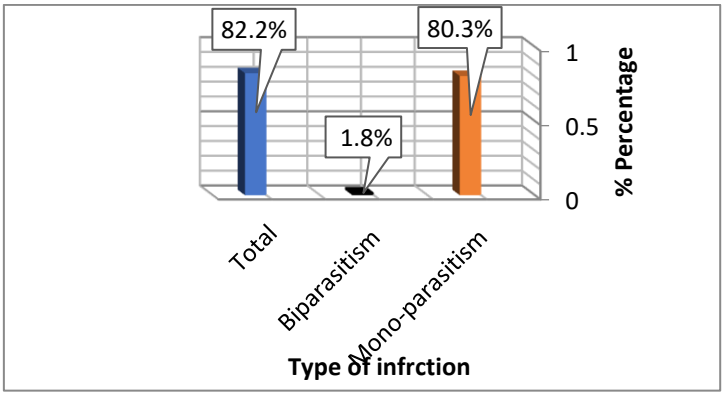



Figure:(4).Distribution of mono&bi-parasitism parasitic infection in positive cases.

**Intestinal parasitic infection prevalence by age group of patients**:
Children with age ≥10 yrs were highly infected with intestinal parasitic infections with the Infection rate of 33% (47.7%),while children between 11-20 yrs were the second largest group (25.2%) infected with Intestinal parasitic infections. flowed by age group 21-30 years(5.6%),then age group31-40years and age groups ≥50 years were less affected, with infection rates(1.9% and 0.9%), respectively(Table 4,Figures 5).

Table:(4).Intestinal parasite infection in different age groups)

| | Age group(years) | Number of samples | Positive(%) |
|---|---|---|---|
| 1 | <10 | 56 | 51(47.7%) |
| 2 | 11-20 | 35 | 27(25.2%) |
| 3 | 21-30 | 10 | 6(5.6%) |
| 4 | 31-40 | 2 | 4(1.9%) |
| 5 | 41-50 | 1 | 1(0.9%) |
| 6 | >50 | 1 | 1(0.9%) |
| | **Total** | 107 | 88(82.2%) |

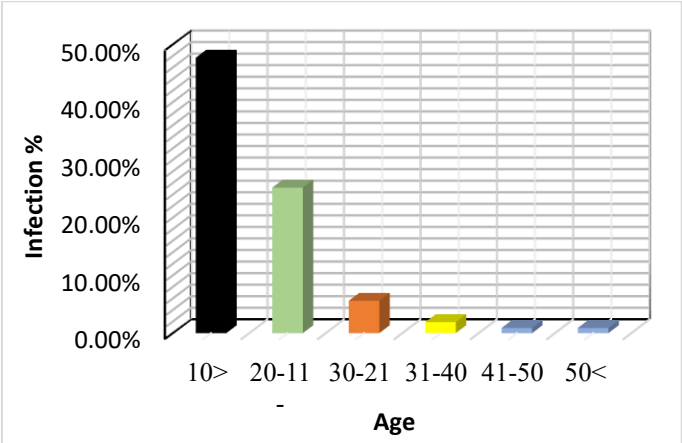



Figure:(5).Distribution of intestinal parasite infection in different age groups.

**Seasonal variation of intestinal parasitic infections**:-

Monthly ,data showed that intestinal parasitic infections was were recorded in July and August 16 patients(15.0%),followed by June13patients(12.1%), May10 patients (9.3%), September 9 patients (8.4%),April 8patients(7.5%),October 5 patients(4.7%),March 4patients(3.7%),February and November 3patients(2.8%),While the lowest rate was 1patients (0.9%)during December.Seasonally,the current results showed that the highest infection rate was 36.4% during the Autumn, followed by28.1% in the Summer and 14% in the spring, while the lowest rate of infection was 3.7%during the winter season.(Table5,Figure6).

Table:(5).Distribution of intestinal parasite infection according to months .

| Monthly | Number of Sample positive | Infection (%) |
|---|---|---|
| February | 3 | 2.8% |
| March | 4 | 3.7% |
| April | 8 | 7.5% |
| May | 10 | 9.3% |
| June | 13 | 12.1% |
| July | 16 | 15.0% |
| August | 16 | 15.0% |
| September | 9 | 8.4% |
| October | 5 | 4.7% |
| November | 3 | 2.8% |
| December | 1 | 0.9% |
| Total | 88 | 82.2% |

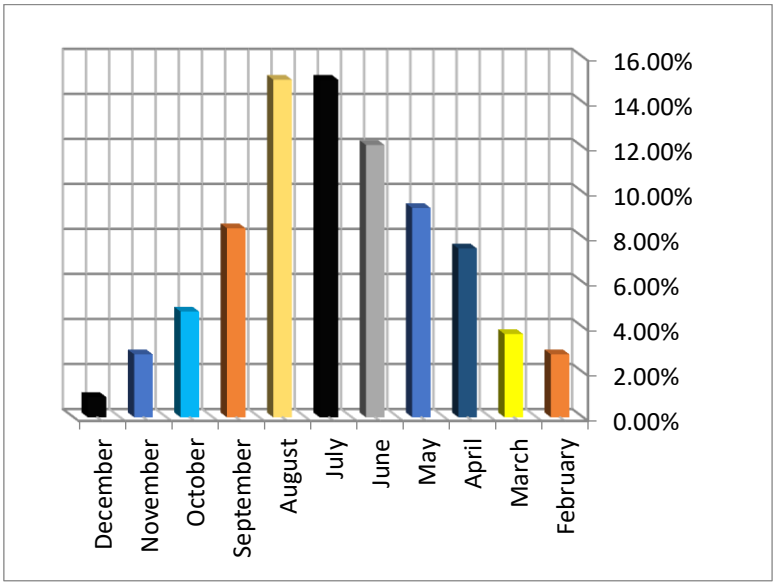



Figure:(6).Distribution of intestinal parasite infections during different months.

## Discussion:-

Parasitic intestinal infections are classified into protozoa and helminthes,and still constitutes one of a significant public health problem in the tropical and sub-tropical areas of the world, typically in undeveloped or developing nations, and the prevalence of intestinal diseases in different areas and countries can indirectly reflect the local sanitation conditions and living conditions[Abu-zeid *et al*.,1998;Amer *et al*.,2018].Demonstrated the current study that the incidence of total intestinal parasites reached(82.2%),and(17%)were free of any parasite. This present study agreement with(Yeneneh,1994)who reported 82.7%of intestinal parasitic infections among residents of 4 villages in southwestern Ethiopia,and the study of(Mengistu *et al.,*2007):The prevalence of intestinal parasitic infection was reported 83% among urban dwellers in southwest Ethiopia.Also,consistent with[Diaz *et al.* ,2006]indicated the prevalence rate estimated with83.5%for intestinal parasites infection in Venezuela. Additionally, the result of previous studies were nearly with our results as 81%by[Abossie&Seid,2014]in Southern Ethiopia,and as 80% in Coast Syria by[1989،محمد].However, the prevalence reported in our study was lower than that reported in Zella city was 87%[ Ali ,2021].The higher rates in the current study may be attributed to improper hygiene and agricultural backgrounds[Amer *et al.*,2015].Other than the rate of prevalence apparently higher compared to other studies conducted in different regions in Libya:In Sebha Central Hospital[Saad *et al*.,2009]as10.5%,[ Gashout *et al*.,2017]in Tripoli as 15.7,In Benghazi[Elammare *et al.,*2004]as 13.83%,in Nalout by[Alkilani *et al*.,2008]as 21%,In Benghazi[Al-Buni&Khan.1998]as%12.88,andin Zawia,in Al Khums,and Houn City[Elsaid *et al*.,2014,Elammari & Nair,2015 and Zaid ,2018)who recorded(10.6%,15.4%,12.7%)respectively. In addition to, the studies of[El-Boulage *et al*.,1980]who obtained 75.6% in Benghazi, in Zawia, it was 69.6%[Shawesh *et al*.,2019],and in Zintan[Al-Arabi&Jamea,2019],where the incidence of intestinal parasites was 59.85%. Also, the rate of prevalence was a higher than in different studies out Libya: from Saudi Arabia by[Amer *et al*.,2015and Al-Shammari *et al*.,2001]Showing an overall prevalence of(45%,32.2%)respectively, in Syria 67.6% [ شحادة 2007،والدبش],and from Brazil[Muniz *et al*.,2002]as 52.4%.That convergence and divergence in the rates of infection recorded in the present study compared with the previous studies can be interpreted on the basis of similarity of environmental hygiene, the local sanitation conditions and climatic conditions of place and that the different sample size, ages and period of the study on the present study or the private use method of laboratory and one in the diagnosis, as well as different time period covered by the study[Reji *et al*.,2011 ;Abossie&Seid,2014;Kumar *et al.,*2019andCelestino *et al*.,2021).The degree of each factor and the prevalence of infections vary from one region to the other[Zaglool *et al*.,2011].likewise, all these conditions favor and facilitate the growth, transmission and exposure to intestinal parasites[Ismat *et al.,2017* and Amer *et al*.,2018].Generally, intestinal parasitic infection are endemic worldwide and more prevalent in countries with unhygienic condition, which favors the transmission of intestinal parasitic[Hassan *et al*.,1989 ,Nadiay et al.,2022,and Karim *et al.,* 2022).

**Pattern of infection(Single and mixed parasitic infection:-**

The results of this study showed that the single infection pattern was common, with a rate of 80.3% compared to the mixed parasite infection1.8% of the total infection.This results confirmed the results of the other studies, which reported that infection with single parasite infection was more common, compared to mixed parasite infection. Likewise the study by[Kassem *et al*.,2013]which indicated Single infection was detected in 69.81 % and 30.19 % mixed infection of positive cases in sirt city,[Elsaid *et*

*al*.,2014]in Zawia, the single and mixed infections were 95.3% and 4.7%,respectively.In Sebha city, the infected people have a singly infection with(96.5%),and only five sample(3.5%)were infected by tow parasites[(Ibrahim&Salem,2020]).Also. This finding was agreement with many studies: In Houn city by[Zaed ,2018]),which showed that the rate of infection with the single type was16.83%, compared to the rate of infection with the mixed parasites of 6.33%,and in Wadi Alshati region, mixed infection was only0.2%compared to 99.7% for the single infection, which reported by[Saad *et al*.,2009],As well as, The studies was conducted by[Ali *et al*.,2021]in Zella city,[ El-Buni&Khan,1998;Elammari&Nair,2015 and Bugharara *et al*.,1999)in Benghazi, and by[Souky&Daaw,2013]in Tripoli city, which reported that infection with one type of parasite was more common, compared to mixed parasite infection.Other study curried out by[Mengistu *et al*.,2007]who reported that, the prevalence of infections double(35.8%)was higher compared to single infections(31.7%)in southwest Ethiopia .Sample size determination, study population and the methods used could attribute to this observed difference in detections of various parasites**.**

**Type of intestinal parasites infection:-**

The occurrence of infection with intestinal helminthes( 73.8%) was much higher than intestinal protozoa this being(8.4%)**,**which comparable with many studies reported in and out Libya: by[Ben-musa,2007]in Tripoli,[ Al-Arabe &Jamaa,2019]in Zintan,Umm Al-Jarsan and Yefren hospitals of the Western Mountain region,[Ali,2021]in Zella,as well as in Baghdad City[Al-Taie&Lazem,2009],and in west India[Ismat *et al*., 2017]was recorded higher prevalence rate of intestinal helminthes than protozoa.This may due to use of human waste as a fertilizer in agriculture.[Habbari *et al,*.1999]was reported that the use of raw sewage and wastewater for agricultural purposes leading to high risks of helminthes infection, and with suitable environmental factors such as moisture and temperature that facilitate distribution and completion of the life cycle of these parasites[Sadaga &Kassem,2007andZaed,2018].For the control of intestinal parasitic infections, health education should be given to population to make them aware about personal hygiene, sanitation, consumption of safe drinking water.On the other hand, The lack agreement in the helminthes prevalence between this study and the previous studies ,where, showed that the prevalence of helminthes parasitic was higher compared to the rate protozoa infection as in Sabha[Ibrahim&Baraka,2019]where reported protozoa infection was(75.6%)more than helminthes rates(24.4%),[ Yones *et al*.,2019]who recorded higher prevalence rate of intestinal protozoa than helminthes(33.5%,22.9%)respectively in rural villages of Egypt as, In Sabha[Ibrahim&Salem,2020],which was reported 96.5% were protozoan compared to helminthes0.7%,and as well as in India[Kumar *et al.,*2019]Among the parasites detected protozoa(83.05%)were a higher than helminthes(16.95%),also this study is in line with reported studies which conducted by[Mengistu *et al*.,2007;Elsaid *et al*.,2014;Saad *et al*.,2009,and Al-Mohammed *et al*.,2010].

**Species of intestinal parasites:-**

Sex types of different protozoa and helminthes species in the current study were showed among patients(Table3),three of which belong to the parasitic protozoan:*E. histolytica*, *E. coli*, and *G. lamblia*, and the three type was due to the intestinal worms *A.lumbricoides*,*Enterobius vermicularis*,and *Hymenolepis nana*.The *E.vermicularis*in was the most frequently recovered parasite(52.3%),and this finding constant with the study which reported *E.vermicularis* as the most common parasite with(48.90%)among patients attending in Zintan,Umm Al-Jarsan and Yefren hospitals in the Western Mountain region[Alarabi&Jamea.,2019] .Enterobiasis is the most common helminthes

infection in developed countries[Ahmed,2023].The present study findings suggested higher rates(52.3%%)when compared to the results of previous studies conducted in Van province in the India (5.77%,1.70%) by[Khan *et al*.,2023 and Kumar *et al*.,2019].Also in village at Abnoub District,Egypt 1.7%[ Yones *et al*.,2019].[Al-Mamouri,2000]was recorded in the district of Mahaweel in Babylon 5.9%,and in Thi- Qar by[Mohamed,2010]as 0.9%.This a high prevalence in present study may be due to face-oral route by ingesting of eggs from contaminate hands poor personal hygiene and poor environmental hygiene and those habits and behaviors that contribute to individual cleanliness which include washing face and hands,regular bathing, nail cutting and wearing clean to be the definition of personal hygiene,addition the eggs of*Enterobious vermicularis* are infectious directly or shortly after excretion in feces[Babara,2002 and Tiwari *et al*.,2013].The recorded in the current study,*E.histolytica/dispar* was the rate of infection(6.5%),the use putting these parasites together, because it cannot distinguished between them microscopically. This the rate in the current study which similar to previous results in different studies done in and out Libya:[Saddag&Kassem,2007]in Derna was 6.6%,and By[2008،دغمان]was 6.1% in coast Syria. This rate of .*E.histolytica/dispar* also nearly the result of[Bougrara *et al*.,1999]in Benghazi was (7.44%) ; by[Sughi&Daw,2013]in Tripoli Central Hospital Laboratory was(6.8%),and in Nigeria was 5.4%[Akinbo *et al*., 2011].On the other hand, this finding is higher than other studies carried in the Western Mountain region 2.7%[ Alarab&Jamea,2019];in Benghazi2.62%[El-Buni&Khan,1998];in Nalout city 2.62%[Al-Kilani *et al*., 2008],and at Azmer-Türkiye2.0%[ Dagei *et al*.,2008].In contrast, the result was lower than studies done in Zelten(11.8%)by[Ali *et al*.,2005];in Brack- Al-Shata(9.5%) by[Saad *et al*.,2009],and in Benghazi (15.7%) by[El-Boulag *et al*.(1980];in India(28.84%)by[Khan *et al*.( 2023]and the study was conducted by[Al-Mashhadain,2000)]as 45.1% in hospitals in kufa & Najaf cites- Iraq.May be attributed to the high prevalence of the parasite to the mode of transmission of direct since it does not need to intermediate host, as it represents flies carrier mechanical for cysts of parasites[Al-Tikriti,2005]with similar rate of *Ecoli* was detected in 6.4% of the sample in our study was consistent with studies were conducted in Misurata city as 6. 3%[El-Serite& Aljhemi,2020]and in Zgazzeg- Egypt that showed rates 6.4%[ Omar&Abdalla, 2022],as well as,in van Province-Turkey as 6%(Cengiz *et al*.,2019).But this rate was low when compared to previous studies conducted by[Saad *et al*.,2009]was 9.5%, in Wade Al-Shati region, at Zawia city 39%[2007،كرور],and also the study was conducted by[Kumar *et al*.,2019],as55.93%in India, in Pakistan as 29%[ Wadood *et al*.,2005],and in some rural village of Egypt[Yones *et al*.,2019],which showed that the rate of infection with *E.coli*(9.7%).This might be due to the attributed to the faster transmission of the organism *E.histolytica/disbaran* and *E.coli* by ingestion of cysts that are transmitted directly by oral-Fecal route in contaminated food and water, as it represents flies carrier mechanical for cysts of parasites[2008،مولود واخرون، Al-Tikriti,2005]. *A.lumbricoides* was the second common intestinal helminthes in the present study(5.6%).It was constant with the study in Nablus area(Ali-Shatayeh *et al*.,1989)was5.7%,in India by[Ismat.,2017]was 5.2%,and in Sebha[Al-gazoui *et al*.,2016]was 5.0%.Moreover,nearly of the rate(6.6%)were recorded by[2008،دغمان]in coast of Syria.However, it was lower than the study which was conducted in India was15.38% by [Khan *et al*., 2023],and in Northeast and southwest Ethiopia by[Hailu&Ayele,2021 and Abate *et al*.,2013]were reported that the rate of parasitic infection(22.6%,23.39%)respectively, as well as lower than in some rural areas of Egypt 11.4%[ Yones *et al*.,2019],also ,the results of another study conducted by[Ali,2021]:the prevalence of Intestinal Parasites among Patients Attending Zella Central Laboratory showed that the rate of infection with intestinal parasites was

24%.This prevalence was quite higher compared with several previous studies Conducted in Zawia(Shawish *et al*.,2019)with0.5%,and in India(3.39%)(Kumar *et al.*,2019).The probable source of these helminthes is soil contamination, usage of human feces as an agricultural fertilizer and the poor environmental sanitation and climatic conditions(hot,wet and humid)favor the persistence of parasite ova in the soil, mainly the soil-transmitted helminthes(geohelminths)*Ascaris lumbricoides*"round worm"(Carneiro*et al*., 2000, Menigistu *et al*., 2007andWHO,2020).The infection rate of *Hymenoleps nana* was 5.6%.This is within the range of the prevalence rate for Hymenolepsis in Zawia(Shawesh *et al.,*2019)was5.9%,in Northeast Ethiopia(Hailu&Ayele,2021)was5.7%,and the results was some nearly between the*H,nana* recovered during the present research and the study was conducted in India(Kumar *et al*.,2019)was(5.08%),and In Ethiopia(Menigistu,2009)was 5.0%.But it was lower than the study which was conducted in Quetta-Pakistan(Karim *et al.*,2022)was 26% ,in India was 9.62%(Khan *et al*., 2023),and in Zagazig district, Northeastern Egypt(Omar&Abdelal.,2022)was reported 8.6%. This is attributed to the hands contaminated with the dangerous role in their transition to the mouth directly, in addition to the role of mice that are adding appropriate for these parasites[WHO,1987].The least recovered parasites during this study was*Giardia lamblia*(3.7%).This finding was consistent with studies by [Ibrahim,2017]in Sebha City as(3.7%),by(Al-Tawaty *et al*.,2002)in Garyounis med.-Benghazi as(3.77%),and by(Ibrahim *et al*.,2018)in Sebha and Mourzak cities(3.75%),as well in Baghdad-Iraq(3.78%)in children, and(3.63%)in adults(2009،حسين),Houn city–Libyia3.5%in children(Zaid,2018),and in Turkiya(Ozgumus&Ele,2007)was 3.5%.In addition to, this results nearly as a result of {Baral *et al*.(2017]where recorded that(3.34%)in a tertiary care hospital in Nepal,(Dyab *et al.,*2016)in Aswan-Egypt 3.2%,by(Ismail,2018)in Taif-Al-Saudi3.1%,(2008،دغمان)at Coast of Syria 3.0%,by(Kotian *et al*.,2014)in the general population from the Uttarakh and hills,srinagar,UK 3.06%, and the last by(Geurden *et al* .,2009)in Belgium as(4%).This result was comparatively higher than his record number of researchers in Libya, including:Bughrara *et al*.(1998)from Benghazi-Libya,who obtained was 2.8%**,**Taiyaba *et al*.(2016)in patients attending Tertiary Care Hospital, Luck now-India as 2.98%,in addition to, a study conducted at Zella was 0.7% by(Ali,2021),too at Sirt city was0.90%(Kassem et al.,2007).Also:(Muniz *et al* ., 2002)in Brazil where the rate was2.4%**.**However**,** apparently lower than in many studies done at Sebha city as 5.0%(AL-gazoui *et al*.,2016),at central medical of Tripoli was 8.39%(Al-Souge&Daw,2013),at Tripoli area as 8.7%(Bolbol*, et al*.,1981),at Zawia was 12.2%(2007،كرور),at Siret(Fatma,2006),as well as in Iraq( 2014،والحسانى والبياتى 2018،مجيد)with rates16.11% , 36.8% respectively,and in many previous studies were conducted in India: the result of *G.lamblia* was17.12% by(Kumar *et al*.,2019),and36.54% by(Khan *et al.*,2023).In addition in some rural village of Egypt the rate 10.0%(Yones *et al.,* 2019),In China 47%(Yang *et al.,*1990)*,*and In Sudan(Magambo *et al*.,1998),where reported that the rate of *G.lamblia*(14.9%),also in India the rate of infection was 20%[Bandari *et al.* ,1999,In marginalized rural areas-Palestine the rate of *G.lambellia* infection was(62.6%,37%)where conducted by[Shubari *et al.,* 2000 and Al-Jawabreh,2019)respectively in Palestine, and other study in Pakistan was showed the infection rate32%(Wadood *et al*.,2005).This might be due to differences in water supply, feeding habits, environmental sanitation, and awareness of the ways of transmission and prevention and control measures of this parasitic infection. The differences in resulting among a range of studies could attribute to methods employed for stool examination,

source of water supply, diversity of personal hygiene, cultural practices in the different study area(Kaur *et al*.,2002).Generally, Similarity between the parasitic species recovered during the present research and other comparable studies conducted in other area could be attributed to be exposed to the same risk factors, which include poor environmental conditions, personal hygiene, consumption of unwashed vegetables, ineffective water treatment systems and poor hygienic habits, and there is many factors affected the distribution and prevalence of various intestinal parasites species included methodology, Sample size and Seasonal variation(Ayalew *et al*, 2011,Teklemariam *et al*.,2014 and Yones *et al*.,2019).

**Prevalence of intestinal parasite infections according to the gender:-**

Regarding gender wise distribution of parasitic infections, Male patients were more commonly affected(51.4%)compared to their female patients (30.8%)(Table2),Which supported with the study conducted by many studies in Libya include:[Dar *et al.*,1979]recorded higher infection rates among male,[El-Boulaqi *et al.,*1980],and[Sughi&Daw,2013]reported a higher frequency of intestinal parasitic infections among male(22.84%) compared with female cases(17%).This same many observation was supported by[Alarabi&Jamea.,2019]in Zintan,Umm Al-Jarsan and Yefren hospitals in the Western Mountain region as(34.01%, 25.85%) respectively,by[Zaid,2018]in Houn,too in their study reported that intestinal parasitic observed the predominance of males over Females(&13%,9.17%)respectively.Also,this finding in agrees with many studies conducted by[Shawish *et al*., 2019]reported of males(65%)over Females(34.9%),[ Dagdag *et al*.,2020]in Koms(52.14%,47.8%)respectively,[ Elsaid *et al*.,(2014)]found the insignificant higher rate in males(11.3%)than in females (10.1%),In Derna city[Sadaag & Kassem, 2007]who mentioned that the prevalence rate was higher in males(17.6%)than females(13.4%),the study reported by[Alsharif&Ibrhim,2022]in Sabha, that intestinal parasitic showed the prevalent rate of males(7.35%)over females(5.85%).In addition to, the results was constant with respect to detection rate among male and Female from other parts outside Libya include:[الحسينى،2012]who observed that the intestinal parasitic infection were more common in Children and adults males (23.36%, 19.28%)respectively, as compared to Females (29.24% , 28.2%).In India[Ismat *et al*.,2015],who reported that the rate of infection were slightly more than in males(36.7%)as compared to females(35.0%).The same result was also reported by[Karim *et al*.,2022]in Quitta -Pakistan as(66%)in male and (34%)in female, in Sao Paulo,Brazile[Muzin *et al*.,2002]who observed that the males were found slightly more prevalent rates(50.3%)as compared to females(49.6%),as well as,In Sudan[Nematian *et al*.,2004]who observed that intestinal parasites infection were ahigher rate than in females.Our observation that intestinal parasitic, especially helminthes infection in children were more dominance in males as compared to females, that's may be due to many reasons :males have the higher risk of contacting to outer environment, more free than females, the social controls or restriction imposed on females, and also because of the increased phenomenon of eating fast food outside the homes[Jasti *et al*. ,2007;Ismat *et al*.,2015 and Yones *et al*., 2019).].On the other hand, in females, the low prevalence might be due to more concern for hygiene care[(Sah *et al*.,2013 and Abioye *et al*.,2019].On the other side, the present study in contrast with the observations made by[El-Ammari *et al*.,2004],reported a higher occurrence of intestinal parasitic infections among female(50%)more than males(46%).Also, in Misurata city[El-serit&Al-jahemi,2020]as10.4% in female,and7.10% in male, and the study of[El-Araby&Jamea2019]was 85.25% in female and 1.34% in male at the Western Mountain region.[ Ibrahim&Salem.,2020],too in their study reported in Sebha,

reported that the prevalence of female(17.2%)as compared to males(12.9%,).These finding was also, approved by many previous studies by[2007،كرور]in Zawia,[Shawesh *et al*.,2019],[Ali,2021]in Zala and[2015،جامع واخرون]in Yefren city**.A**s well as, the many studies conducted by[Abdalla *et al*., 2024]in Jeddah,Saudi Arabia, Most infected patients were females(61%)compare able to male(39%),also the study of [Gelaw *et al*. ,2013,Diongue *et al*.,2017,and Mote *et al*.,2025]which, reported a higher frequency of intestinal parasitic infections among female more than males**.** The similar result is observed by[Ndiaye *et al*.(2022)]in Dakar,Senegal,who observed that intestinal parasites infection were moderate higher rate than in females(19.98%)as compared to males Patients(17.93%).This variation of exposure among the different sex groups might be due to differences in occupational exposure in different communities and study area. In addition to, this finding was contradicted the study conducted by[Fatma,2006]reported the same prevalence rate among females and male.Moreover,[Abbaszadeh Afshar *et al.* 2020]indicated that there is no any correlation between gender and intestinal parasitism,whilest,the study of(Amer *et al*.,2016) have reported a significant relationship between gender and intestinal parasitic infections.Generally,intestinal parasitic infections are associated with poor sanitary habits and improper hygiene.

**The distribution of patients by age groups:-**

Intestinal parasitic infection are a major public health concern affecting both children and adults of all age. However, school-aged children (6–15 years) are the most affected and important risk groups[WHO,2011& 2015].The current study revealed a high prevalence of intestinal parasitic infections among(≤10yrs)with a percentage of47.7%,compared to other age group. This finding was approved by[Alaraabi&Jamaa2019]in West Mountain region[2015،جامع واخرون]inYefren city,and[2022،وعيسى2007،كرور]in Zawia,In addition the studies in Komes[Dagdag *al*.,2020]in Komes, and in Sabha[Al-sharif &Hussine,2022],and agreed with the previous studies conducted by[Magambo *et et al*.,1998]in Sudan,(2014،البياتى والحسانى )inDiwaniya-Iraq,and[Morsy&Elmaridi,1978]in Jourdan ,similarly two studies were conducted in Turkey was conducted by[Balcioglu *et al.,*2003andPinar *et al*.,2004],as well the other study in Quitta – Pakistan[Karim *et al*., 2022],and in Nepal[Baral et al., 2017]Who found that the high level of Intestinal Parasitic Infections was among patients less than 10years than other group years. This age group were notknowing the conditions of hygiene, in addition to their immunity is yet to be fully developed and resistance against infections[Rice *et al*.,2003].As well as, to their close contact with the contaminat ed environment, and poor other hygiene practices[Amer *et al*.,2018].All these factors put them at greater risk of infection compared to old age groups(Mengistu *et al.,*2007; Ekpenyong *et al*.,2008;Emmy *et al*.,2012,and Dagdag *et al*., 2020].This might be due to deterioration of the standard of personal hygiene and sanitary conditions in these groups. Also because of the use of human feces as soil fertilizers which increases the chance of spreading infection. There are variations in other studies where adults were more infected with parasites. Among people in Sebha City[Ibrahim *et al.,*2020]indicated that the highest prevalence of infection was found in the group aged 30-39 years (23.5%)compared to the other age groups, and the lowest rate was in the age group 0-9 years(9.3%),Another study in Benghazi[Elammari *et al*.,2004]who showed the high infection was noted among 30-40 years compared to the other age groups, so this depends on various factors like personal hygiene, knowledge about hand hygiene, geographical area and health education[Kumar et al., 2019],but Contrary,[Hussein 2001]disavowed any relationship between age or six and intestinal parasitism.

**Seasonal variation of intestinal parasites:-**

These parasites are prevalent in regions characterized by tropic and sub tropic climates, which often include countries in the developing world to the spread of these parasites[Sutrave & Richter, 2021].In our study, The highest prevalence of infections were noted during the July and August months(15.0%)to each one from the rest of months, followed by12.1% in June, and the lowest infection rates in February and November by 2.8% to each one. These findings are corroborated with the study conducted in Zawia city was conducted by[2022،عيسى]showed a higher prevalence rate injury and August than other months of year, and inconsistent with other studies conducted by[Ibrahim&Salem,2020]Among People in Sebha City, which the results showed that the highest infection rate was in February (22.8%),and the lowest rate was in June by 8.0%.Seasonally ,data showed that intestinal parasitic was the highest rate in Summer and autumn season(36.4%,28.1%) respectively, then the rate of infection during the spring and summer of the present study showed that the highest prevalence of intestinal parasites was during the Summer season(14% ,3.7%)respectively,while the lowest rate was recorded during spring and winter season(Table5,Figure6).These result was in line with the observation other studies(Al-Saqur *et al*.,2017),which showed that the highest prevalence of intestinal parasites in Iraq was during the summer and Autumn seasons (3.8%,3.5%)respectively,and Amer *et al*.(2018),They recorded a high level of infection during Autumn and summer seasons(0.79%,0.63%) respectively,while the lowest in Winter (0.25%).As well as,in agreement with the studies of(Omar&Abdalla,2022)in Zagazig-Egypt,They recorded higher infection rates of intestinal parasites during summer season(66.90%),and the lowest in Winter(35.80%).Also this study were consistent with studies of (Sughi&Daw,2013),In Tripoli,and the studies of(Yang *et al*.,1990 and Jaran,2016)in Jourdan, where indicated the high rate of infection during summer and spring seasons.The highest prevalence rates was seen during the Autumn(27%)and spring(26%),which higher than Winter(24%)and the lowest rate in summer season(23%)in Zala by(Ali,2021).The infection rate was higher in samples collected during the Summer months and Autumn seasons where temperature and humidity are quite high, while the infection rate was low in the samples collected during spring and winter months where temperature and humidity are relatively low.In the community the highest rate of infection was in summer ,may be due to the activity of parasite stage in environment condition. In general, most parasites increase and distribute in the favorable environmental conditions such as; optimum temperature and humidity.

## Conclusion:-

The present study showed the incidence of intestinal parasitic was significantly higher infection among patients, and intestinal helminthes are common than protozoa in our study.*E.vermicularis* was found to be the most common of intestinal parasitic diseases among the study population. Therefore, this study highlights the necessity of focused health education on personal hygiene and environmental sanitation for people especially may improve their awareness of fecal-oral transmissions of intestinal parasites and specific treatment in order to effectively control intestinal parasitic infections, in addition to routine screenings and a concentration technique increases the validity of the estimates.

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