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PREFACE

We would like to present, with great pleasure another volume of a Majmaah Journal of Health Science MJHS. It is a great challenge to bring a new journal into the world, especially when the journal aims to publish high quality manuscripts. The main object of MJHS is to publish the research papers well in time but with peer review by subject experts. This is the 3rd year from the time we published the inaugural volume of this journal. The journal has Editorial Board of Scientist of International repute. With our editorial board's cumulative experience, this journal brings a substantial representation of the field of health sciences. Without the service and dedication of our editorial board, MJHS would have never existed. This is an open access journal which means that all content is freely available without charge to the user or his/her institution. Users are allowed to read, download, copy, distribute, print, search, or link to the full texts of the articles in this journal without asking prior permission from the publisher or the author.

The Journal is currently in the process of getting indexed into several of databases. The success of our journal depends directly on the number of quality articles submitted for review. Accordingly, I would like to request your participation by submitting quality manuscripts for review and encouraging your colleagues to submit quality manuscripts for review. One of the great benefits we can provide to our prospective authors, regardless of acceptance of their manuscript or not, is the mentoring nature of our review process. MJHS provides authors with high quality, helpful reviews that are shaped to assist authors in improving their manuscripts.

We thank our editors for sharing their invaluable editorial experience with us. The editorial board of MJHS has done a tremendous job; I thoroughly enjoyed the professionalism and enthusiasm of our editorial team. The journal would not be here before you without the continuous efforts of Dr. Khaled Al Tohami, Dr. Moattar Raza Rizvi, Dr. Fuzail Ahmad & Mr. Waqas Sami, the assistant to the editorial board, who kept us all on track. I thank all our reviewers, for making themselves available and providing us with timely review.

The Research papers, reviews or short communications may be sent by email to the Editor-in-Chief at the following email address: mjhs@mu.edu.sa

Editor in Chief

Prof. Mohammad Othman Al-Rukban

ORIGINAL ARTICLE

The Association between Infant Feeding Patterns and Type I Diabetes in Children at Ministry of National Guard, Health Affairs Hospital, Riyadh

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Abstract

Introduction: There is little information on the association between early infant feeding and type 1 diabetes in children in Arabian countries. This study aimed to investigate the influence of breastfeeding on the onset of diabetes in children. **Methodology:** The study included 200 subjects (99 cases and 101 controls). Their age ranged between 1 and 14 years. They attended Ministry of National Guard - Health Affairs Hospital, Riyadh, (NGHA) during the study period (September to November 2013). Mothers were interviewed by research coordinator to fill the questionnaire. Descriptive analysis of cases and controls were carried out, and Chi-square, Odds-ratios and T-test estimates were utilized for analysis. **Results.** There was no difference between the two groups with regard to intake or duration of breastfeeding, the age of initiation of formula's milk and weaning. The study showed that subjects with type 1 diabetes had higher birth weight (p= 0.009). In addition, the study showed that the current daily consumption of cow's milk in subjects with type 1 diabetes were higher significantly in patients group (p= 0.04). Those in the type 1 DM group were more likely to have a sibling with type 1 diabetes (p=0.005). **Conclusions:** Patients did not differ significantly from the controls with regard to dietary practices.

Key Words: Type 1 diabetes mellitus; case-control study; infant feeding; birth weight; family history of type 1 diabetes.

الملخص

المقدمة: هناك القليل من المعلومات عن العلاقة بين التغذية في الرضع في وقت مبكر وداء السكري من النوع 1 في الأطفال في منطقة الخليج. **هدف الدراسة:** التحقق في تأثير الرضاعة الطبيعية كعامل وقائي ضد ظهور مرض السكري لدى الأطفال. **طرق البحث:** أجريت الدراسة على 200 شخصا (99 طفل مصاب بمرض السكري و101 طفل غير مصاب بالمرض) تتراوح أعمارهم ما بين 1-14 عام الذين حضروا المستشفى الحرس الوطني بالرياض، المملكة العربية السعودية، خلال فترة الدراسة (من سبتمبر إلى نوفمبر 2013). وقد تم اختيار كل من الأطفال المصابين والغير مصابين بالمرض عن طريق اخذ عينات عشوائية. وأجريت مقابلات مع الأمهات لجمع البيانات عن طريق منسق الأبحاث لملء الاستبيان. **النتائج:** شملت الدراسة 200 طفل (101 طفل غير مصاب و99 طفل مصاب بمرض السكري). 51.2٪ من الاطفال الغير مصابين بالمرض كانوا من الذكور و48.8٪ منهم اناث و50٪ من الاطفال المصابين بالسكري كانوا اناث و50 % من الذكور. لم يوجد فرق بين المجموعتين فيما يتعلق بتناول الحليب الام أو مدة الرضاعة كما انه لم يكن هناك اختلاف كبير بين المجموعتين فيما يتعلق بسن بدء الحليب أو الفطام. سن التي بدأ فيه الطفل بأخذ الأطعمة الصلبة لأول مرة لا تختلف كثيرا بين المجموعات (P=0.14). أيضا اظهرت الدراسة بأن الأوزان عند الولادة للأطفال المصابين كانت أعلى من أوزان الأطفال الغير مصابين بالمرض (P= 0.009). وأظهرت نتائج الدراسة أن الاستهلاك اليومي الحالي من حليب البقر في الاطفال المصابين بمرض السكري كانت أعلى بكثير من الاطفال الغير مصابين بالمرض (P-value 0.04). أيضا مجموعة الأطفال المصابين بالمرض لديهم احتمالية أكبر ان يكون لديهم اخوه مصابين بمرض السكري (p=0.005). **الخلاصة:** المرضى في هذه الدراسة لا يختلفون كثيرا عن الاطفال الغير مصابين بالمرض فيما يتعلق بالعادات الغذائية، أو الرضاعة الطبيعية، أو سن الفطام، أو ترتيب الطفل في الأسرة. نحتاج الى دراسة متعمقة في المجتمع السعودي في المستشفيات قد تستطيع إيضاح هذه العلاقة بشكل أفضل. في الدراسة وجد ان وزن الطفل عند الولادة، الاستهلاك اليومي لحليب البقر، والتاريخ العائلي لأخوة مصابين بمرض السكري من النوع 1 ترتبط علاقة وثيقة مع خطر الإصابة بهذا المرض. **الكلمات الدلالية:** مرض السكري من النوع 1؛ دراسة الحالات بين المصابين والغير مصابين بالمرض؛ العوامل البيئية؛ تغذية الرضع؛ وزن الولادة؛ التاريخ العائلي لمرض السكري من النوع.

Introduction: Type one diabetes mellitus (T1DM) is the most common chronic disease in childhood[1]. The incidence of childhood type 1 disease is rising worldwide, with reported annual increase of 2-5 percent in Europe, the Middle East, and Australia.[2-7]

Both genetic and non-genetic factors contribute to disease risk. Nonetheless, studies of familial clustering suggest that genetics accounts for only about half of the risk fraction.[8-9]

The only environmental trigger undergoing active investigation is early exposure to cow's milk proteins, which may be important in T1DM pathogenesis; conversely, breast milk may protect against triggering of the autoimmunity attacks.[10]

A series of studies has shown that children with newly diagnosed type 1 diabetes have increased concentrations of antibodies to dietary antigens and cow milk proteins in particular.[11-13] It is thought to be caused by inflammation and increased gut permeability which represent an early immune aberration that predisposes to b cell autoimmunity and type 1 diabetes. Gut permeability decreases faster over the first months of life in breastfed infants compared with infants given conventional or partly hydrolyzed formulas.[14] Early enterovirus infections have been implicated as a strong trigger candidate for b cell autoimmunity.[15] It is shown that breastfeeding protects against enterovirus infections in the infant period[16-17] and, accordingly, this would decrease the risk of enterovirus-triggered b cell autoimmunity. Whether or not breastfeeding protects against type 1 diabetes is a controversial issue and current evidence provides contradictory results in regards to the association of breastfeeding or early introduction of cow's milk and formula with the development of type 1 diabetes.

Although it is important to identify the association between breastfeeding and cow's milk and development of T1DM, we are not aware of any available studies in this regard in Arab countries.

This study aimed to assess the relationship between breastfeeding and development of T1DM in Saudi children.

Methodology

A case - control study was conducted over the period of 3 months starting September 2013. A total of 99 type 1 diabetic patients and 101 controls without diabetes mellitus were included in the study. Sample size of 100 cases and 100 controls was based on the assumption that cases would be 20% less likely to have been breastfed (40% cases vs 60% controls) or 20% more likely to have been bottle fed with (80% cases vs 60%), a power of 0.8 and alpha of 0.05.

Cases were defined as children diagnosed with type 1 diabetes under age of 14 years old attending pediatric endocrine clinic at NGHA, Riyadh. Equal number of non diabetic control child were selected from children attending Health Care Specialized Center (HCSC) primary health care in NGHA in Riyadh, systematically chosen by a random number from the daily appointment list. Adult and patients with type 2 DM were excluded.

Data on relevant exposures were asked from mothers by means of extensive interview done by a research coordinator to fill the questionnaire that is identical for case and control subjects.

The questionnaire was adopted from a similar study done in Germany[18] after taking permission from its primary author and was customized according to our culture and was validated by an expertise then it was translated to Arabic and back to English.

Basic information was collected on sex, age and diet. History of diet was taken through questions on the duration of overall breastfeeding and age at first introduction of breast milk substitutes, age at introduction of solid foods to infant feeding, type of breast milk substitute fed during the first year of life and current level of customary fresh cow's milk intake.

Mother's age at birth of the index child, child weight at birth, birth order, and the child's medical history were recorded. Further questions addressed family size. Genetic predisposition to of T1DM was covered through family history of T1DM.

Permission was procured from the king Abdullah international medical center in Riyadh, and a verbal consent of each participant `parents obtained before filling the questionnaire.

Statistical package for social sciences (SPSS) software version 19.0 was used for data entry and analysis. Descriptive statistics (e.g., number and percentage) were calculated for each and every variable wherever applicable. To see the significant difference between the two groups for the continuous variable, we had applied Student's T-test (unpaired). Chi-Square tests ($\chi 2$) were employed to test for the association between two categorical variables we had applied Chi-square test. P values of 0.05 or less were considered statistically significant.

Results

A total of 200 mothers of children below 14 year old including 101 controls and 99 type 1 diabetic patients were interviewed as shown in table 1. It illustrates that 51.2 % of controls were males and 48.8 % were females and 50 % of cases are female and 50 % were males. Subjects were divided into 4 groups depending on mothers' education level, namely illiterate, primary/ intermediate, secondary and university. No significant difference was observed in the distribution of patient or control subjects at any level. It was noticed that children born to mothers with high education level were at high risk of developing diabetes as compared to those who were born to illiterates, although it was not statistically significant (p= 0.17). Table 1 also illustrates that no significant difference exists between the patients and controls with regard to the history of bronchial asthma and eczema. Similarly, working status of the parents also did not differ significantly between the two groups.

Figure 1 shows that there is a positive association between birth weight and development of the T1DM. The patients group tend to be heavier than those with no diabetes are and the difference was statistically significant (p= 0.009).

Table 1: Baseline demographic characteristics of patients and control subjects

Item	No	Cases		Controls		P-value
		No	%	No	%	
Age, years (Means, SD(	**200**	8.86±2.80		6.33±2.22		**0.000**
Gender						
Female	**114**	57	**50.0**	57	**50.0**	**0.871**
Male	**86**	42	**48.8**	44	**51.2**	
Child weight in gm (Means, SD)	**200**	3140.9±561.3		2929.7±564.4		**0.009**
Mother with DM						
Yes	**16**	4	**25.0**	12	**75.0**	**0.039**
No	**183**	95	**51.9**	88	**48.1**	
Mother with GDM						
Yes	**17**	7	**41.2**	10	**58.8**	**0.434**
No	**180**	92	**51.1**	88	**48.9**	
Mother age at child birth						
≤ 20	**28**	15	**53.6**	13	**46.4**	**0.903**
21-25	**72**	35	**48.6**	37	**51.4**	
26-46	**99**	49	**49.5**	50	**50.5**	
Order of birth of child						
First born	**46**	24	**52.2**	22	**47.8**	**0.88**
Second born	**65**	31	**47.7**	34	**52.3**	
Third or more in birth	**87**	44	**50.6**	43	**49.4**	
Sibling with DM						
Yes	**25**	19	**76.0**	6	**24.0**	**0.005**
No	**175**	80	**45.7**	95	**54.3**	
Gender of sibling with DM						
Female	**14**	10	**71.4**	4	**28.6**	**0.26**
Male	**10**	9	**90.0**	1	**10.0**	
No. of sibling ≤ 18 years (mean ±SD)	**198**	4.32±1.97		3.22±1.60		**<0.001**
Mother education						
Illiterate	**24**	8	**33.3**	16	**66.7**	**0.170**
Primary/intermediate	**61**	30	**49.2**	31	**50.8**	
Secondary	**61**	36	**59.0**	25	**41.0**	
University	**54**	25	**46.3**	29	**53.7**	
Mother work status						
Housewife	**160**	79	**49.4**	81	**50.6**	**0.710**
Employee	**36**	19	**52.8**	17	**47.2**	
Asthmatic						
Yes	**28**	15	**53.6**	13	**46.4**	**0.640**
No	**172**	84	**48.8**	88	**51.2**	
Eczema						
Yes	**7**	5	**71.4**	2	**28.6**	**0.230**
No	**193**	94	**48.7**	99	**51.3**	

Table 2: Details of breast-feeding and consumption of food among the patients and control subjects

Item	No	Case		Control		P-value
		No	%	No	%	
Breastfeeding given						
No	**34**	14	**41.2**	20	**58.8**	**0.280**
Yes	**166**	85	**51.2**	81	**48.8**	
Bottle feeding given						
No	**25**	16	**64.0**	9	**36.0**	**0.115**
Yes	**91**	82	**90.1**	9	**9.9**	
Type of breastfeeding						
Breastfeeding only	**25**	15	**60.0**	10	**40.0**	**0.231**
Bottle feeding only	**141**	70	**49.6**	71	**50.4**	
Mixed feeding	**32**	12	**37.5**	20	**62.5**	
Duration of breastfeeding						
≤ 4 months	**69**	34	**49.3**	35	**50.7**	**0.742**
5-6 months	**33**	16	**48.5**	17	**51.5**	
> 6 months	**64**	35	**54.7**	29	**45.3**	
Age at introduction of solid food						
3-4 months	**37**	19	**51.4**	18	**48.6**	**0.480**
5-6 months	**100**	65	**65.0**	35	**35.0**	
≥ 7 months	**20**	7	**35.0**	13	**65.0**	
Current cow milk consumption						
Non	**22**	8	**36.4**	14	**63.6**	**<0.001**
< 200 ml	**66**	27	**40.9**	39	**59.1**	
≥ 200 ml	**111**	64	**57.7**	47	**42.3**	

There was no difference between the 2 groups with regard to intake or duration of breastfeeding (p= 0.28) as shown in Table 2. It also shows that there was no significant difference between the 2 groups with regard to the age of initiation of formula's milk and weaning. Interestingly we have noticed that with postponing formula's milk introduction to children, less cases of type 1 DM was diagnosed. Only 25 % of the cases developed if formula's milk postpone until after age of 7 months as compared to 57 % if it introduced before 4 months, however it was not statistically significant (p= 0.48).

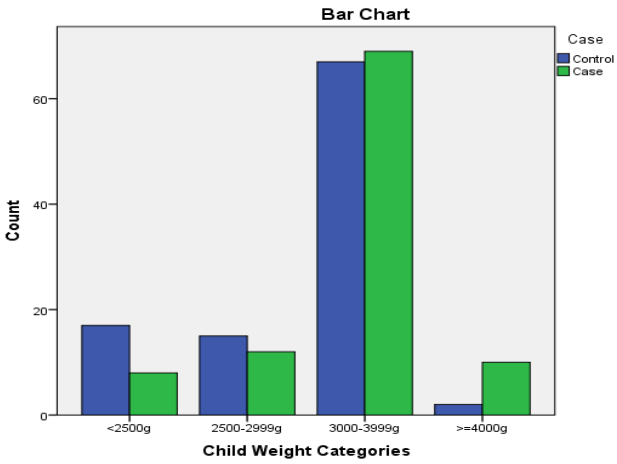

Fig. 1: Association of T1DM with birth-weight among cases and controls.

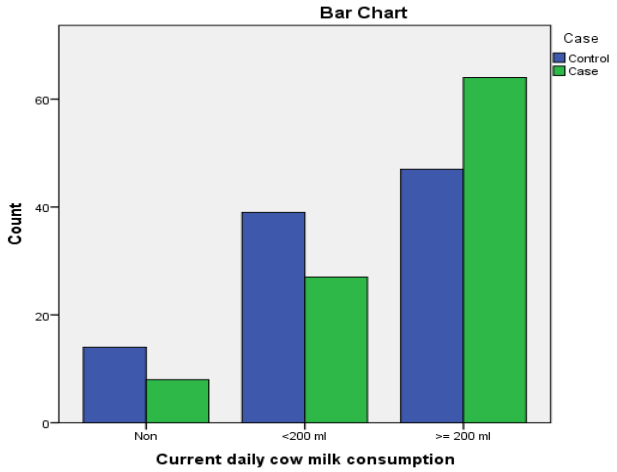

Fig. 2: Cases and controls current daily cow's milk consumption.

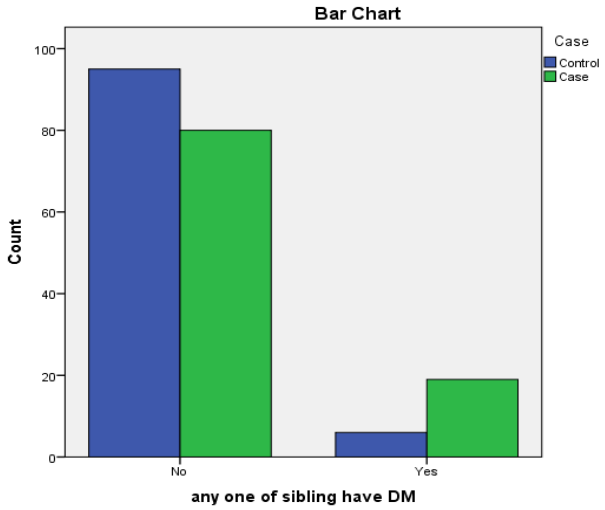

Fig. 3: Cases and controls with siblings with T1DM

Similar finding with solid food introduction with 35 % of cases of T1DM was diagnosed if it was after age of 7 months as compared to 52 % if started earlier but it was not statistically significant (p= 0.14). The age at which the subjects were fed solid food for the first time did not differ significantly between the 2 groups (p= 0.14). The study results showed in Fig. 2 that the current daily consumption of cow's milk in subjects with diabetes were higher significantly in patients group (p=0.04).

Interestingly, it was found that children with T1DM were less likely to have a mother with diabetes than controls (p=0.039) as seen in Table 1. Also patients with T1DM were more likely to have a sibling with T1DM as over 75 % of patient with T1DM have sibling with DM as compared to 24 % in normal controls (p=0.005) as shown in figure 3.

Discussion

This case control study in children attending NGHA showed no statistically significant association between breastfeeding, bottle feeding, age at introduction of solid food, or mother age at childbirth, was found with T1DM in children. Factors associated with type 1 diabetes in children were found to be family history of T1DM in siblings, larger birth weight, and high current cow's milk.

Infant's diet has been hypothesized to be involved in the initiation of the T1DM autoimmune process by impairing the

maturation of the gut-associated immune system and or by providing antigens cross–reactive to islet cell antigens (molecular mimicry).[19] The results of this study on infant diet didn't support any protective role of breastfeeding or a late introduction of breast milk substitute as it didn't find any association between duration of breastfeeding between the 2 groups. The diabetogenic effect of animal milk is also a matter of debate. Earlier retrospective studies did not consistently find evidence for a protective effect of breastfeeding and late exposure to formulas or cow's milk.[21-24]

Recent prospective investigations, which were not subject to recall bias, also produced conflicting evidence on the association between infant diet and the risk of beta cell immunity. Some studies did not find an association between diabetes autoimmunity and breastfeeding duration or early formula's milk introduction, whereas other studies did.[25-29] Recently, a randomized double-blinded dietary intervention pilot trial in newborns genetically at increased risk for T1DM provided first evidence that casein hydrolysate formulas may protect against the development of islet cell autoimmunity.[33]

Recent prospective studies found association between increased beta cell autoimmunity and early or late introduction of cereals /gluten or early introduction of fruits and roots into infant diet.[26-28] Both early and late first exposure to any solid food predicted development of T1DM was shown in one cohort study done in Colorado.[34] The data in this issue is conflicting. The present study did not find any association between the early introduction of solid food and the development of the type 1 diabetes.

Cow's milk influences the composition of the gut flora,[35] In addition cow's milk contains bovine IgG and IgA which could further modify the flora and modulate the immune response to the flora.[36] In the current study, it was noticed that there is significant increase in current daily cow's milk intake inpatient with diabetes. The result of the present study was contrary to the result of one study done in Germany[18] where it showed an inverse relationship in this issue.

A positive family history of T1DM has consistently been reported to raise type 1 diabetes risk among relatives.[20, 37-43] It is known that sibling of a diabetic probands have a higher risk of T1DM than unrelated individuals in the general population at about 3-10%.[43-46] The current study evaluated risk of T1DM in family member and found that T1DM in siblings determines a 3.7 times higher risk of the disease. This is similar to what has been found in study done in Lancashire and Cambria, UK.[36]

The study results showed more cases of maternal T2DM among controls than among cases of T1DM, which support the evidence that there is no association between T1DM and T2DM. This is consistent with studies done in UK[36] and Italy[47] which showed that family

history of type 2 doesn't influence the risk of T1DM in first degree relative.

Epidemiological evidence on the association between level of education of parents and T1DM risk in children is conflicting. In the present study, parents educational background didn't vary between patients and control although there was an interesting finding that mothers with higher education level were having more chance to have diabetic child but it wasn't statistically significant. If we increase the sample size, it may become significant.

Crowded household which was reflected by number of sibling has been observed to be associated with reduced risk for T1DM in case control and recent cohort studies,[20,48-50] Our study did not show any association between the number of sibling and the development of T1DM. The study results did not support the hygiene hypothesis which suggesting that more siblings could lead to earlier and more antigens exposure in life. The hygiene hypothesis suggests that improved hygiene and living conditions have decreased the frequency of childhood infections, leading to a modulation of the developing immune system and increasing risk for autoimmune such as T1DM.[51,52]

There is a considerable body of evidence that higher maternal age at childbirth is associated with a higher risk of T1DM.[39,40,49,53-57] The present study results did not show any association in this regards.

Results in the relation between birth weight and T1DM risk are conflicting. Some studies observed an increased risk in children with high birth weight and lower T1DM risk among children with low birth weight.[57-59] But other studies observed also low birth weight to be associated with increased risk[60-62] while others found no association.[20,55,63] In concordance with the study done in Germany,[18] present study indicated a relationship between higher birth weight and T1DM risk as cases tend to be heavier than control subjects. Data with regard to the order of birth were comparable between the 2 groups in the current study. Other studies have found an increased risk of T1DM among low birth order children.[64-65]

We did not find any significant difference among either sex in developing T1DM which is consistent with one German study[66] which did not find significant difference, whereas the Hawaiian IDDM registry[67] showed a higher incidence among girls. In another study done in India there was a male predominance.[68] Therefore, influence of sex in etiology is not clear.

Regarding the association between atopy and T1DM, one meta-analysis[69] found that there is an inverse relationship between asthma and T1DM. Failure to detect such like association between asthma or eczema and T1DM in the present study may be attributed to the small sample size of our study.

This study has some limitations that should be mentioned. A case control study design generally depends on the collection of retrospective data, thus introducing the possibility of recall bias. The study was conducted in limited area and does not necessary reflect the characteristic of the general population. Finally, there was wide age range (1-14 years). This is because the fact those available cases were limited.

Conclusively, children with T1DM do not differ significantly from their healthy peers in nutritional status. However, child birth-weight, current cow's milk ingestion, and family history of siblings with type 1 diabetes show a significant association with T1DM.

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ORIGINAL ARTICLE

Prevalence and Antibiotic Resistance of Cronobacter Spp. Associated with Powdered Infant Milk Formulas and Dried Milks in Saudi Arabia

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Abstract

Introduction: This study examined the presence of the pathogen Cronobacter spp. in powdered infant milk formulas (PIMF), and dried whole and skim milk samples distributed in Saudi Arabia. **Methodology:** Culture-based method, biochemical conformation test and real-time PCR were used for detection. **Results:** Cronobacter spp. was detected in 10% of PIMF and 20% of dried whole milk, but not in dried skim milk samples. Real-time PCR showed that PIMF samples generally contained higher numbers of Cronobacter spp. than dried whole milk samples. Isolates showed resistance to 9 of 10 antibiotics, being more frequently resistant to penicillin and tetracycline Both single and multidrug resistance was observed. **Conclusions:** This study reports the association of antibiotic-resistant Cronobacter spp. with PIMF and dried whole milk products distributed in Saudi Arabia.

Key Words: Cronobacter, antibiotic resistance, infant milk formulas, real-time PCR

الملخص

مقدمة: تناولت هذه الدراسة مدى تواجد بكتيريا الكرونوباكتر (Cronobacter spp.) في مسحوق المركبات الحليبية للأطفال الرضع إضافة لعينات الحليب مجفف كامل ومنزوع الدسم والتي تم تداولها في المملكة العربية السعودية. بالكشف عن تواجد هذا الميكروب الممرض في العينات استخدام عدة طرق شملت الاستزراع والفحص الكيميوحيوي التأكيدي إضافة للفحص الجزيئي باستخدام تفاعل إنزيم البلمرة المتسلسل الآني (Real time PCR). تم الكشف عن تواجد البكتيريا الكرونوباكتر في 10% من عينات المركبات الحليبية للأطفال الرضع و 20 % من عينات الحليب المجفف كامل الدسم بينما خلت منه عينات الحليب المجفف منزوع الدسم. بينت نتائج الفحص باستخدام إنزيم البلمرة المتسلسل الآني (Real time PCR) أن عينات المركبات الحليبية للأطفال الرضع تحتوي في الغالب أعدادا أكبر من هذا الجنس البكتيري مقارنة بعينات الحليب المجفف كامل الدسم. إختبار المضادات الحيوية أظهرت أن البكتيريا المعزولة في هذه الدراسة كانت مقاومة لتسع مضادات حيوية من أصل عشرة تم استخدامها, وكانت المقاومة الأكثر تكرارا ووضوحا ضد البنسلين والتتراسيكلين. المقاومة الأحادية والمتعددة كلاهما تم الحظه. هذه الدراسة تثبت تواجد بكتيريا الكرونوباكتر المقاومة للمضادات الحيوية في مركبات حليبية للأطفال الرضع وكذلك في منتجات حليب مجفف كامل الدسم تسوق في المملكة العربية السعودية.

Introduction: Cronobacter spp. (formerly known as Enterobacter sakazakii) is an opportunistic pathogen that has emerged recently in association with sporadic disease cases and outbreaks involving debilitated neonates fed dried infant formulas.[1-3] Infections with Cronobacter spp. may lead to meningitis, necrotising enterocolitis, and bacteraemia that could be associated with a high mortality rate of 40–80%[4] Brain damage or neurological disorders, such as hydrocephalus and quadriplegia, may also manifest in surviving patients[5]. Both infants and elderly individuals were found to be infected by Cronobacter spp.[6] While the pathogen was recovered from various sources, including soil, water, vegetables, and foods, it was most frequently detected in dried milks and powdered infant milk formulas (PIMF).[7-11] Cronobacter spp. has thus been classified as a category A organism that is

clearly associated with causing disease via PIMF.[3] Previous studies have reported the association of Cronobacter spp. with dried milks and PIMF in different Western countries. Other reports also demonstrated its presence in PIMF and dried milk products distributed in the Middle and Far Eastern regions, including Jordan,[12-13] Egypt[10,14] and China.[15] A previous study also showed the contamination of the Saudi Arabian artisanal fermented drink "Sobia," made from wheat and malt flours, with Cronobacter spp.[16] However, no further information is available on the association of Cronobacter spp. with PIMF and powdered milks in Saudi Arabia. The present study was therefore designed to address this aspect, and to characterise the antibiotic resistance of Cronobacter spp. isolates associated with these products.

Methodology

Detection of Cronobacter spp. in powdered infant milk formulas and dried milk samples: A total of 60 samples of powdered infant milk formulas (PIMF) (n=20), dried whole milk (n=20), and dried skim milk (n=20) were randomly collected from local markets in Riyadh, Saudi Arabia. These samples were examined for the presence of Cronobacter spp. using the FDA method[8], as modified by El-Sharoud et al.[10,14,11]. Samples were pre-enriched by mixing a 25 g sample with 225 mL buffered peptone water (BPW) broth (Oxoid, Basingstoke, UK), followed by incubation at 37ºC for 24 h. Aliquots of 10 mL of the pre-enriched samples were then inoculated into 90 mL of the EE broth (Oxoid), followed by incubation at 37ºC for 24 h. A 3 mm loopful (10 µL) of the enterobacteriaceae enrichment (EE) broth culture was finally streaked onto the brilliance Enterobacter sakazakii agar (DFI agar) (Oxoid) followed by incubation at 37ºC for 24 h. Suspected blue-green colonies were then picked up and examined by Gram-staining and for the formation of yellow pigmented colonies on tryptone soy agar (TSA) (Oxoid) at 25ºC for 48–72 h. Potential isolates producing a negative Gram-reaction and yellow pigment on TSA were further examined using the Rapid ID 32 E miniaturised kit (bioMerieux, Marcy l'Etoile, France).

Real-time PCR confirmation of Cronobacter spp.: Real-time PCR was used to confirm Cronobacter spp. isolates recovered from the PIMF and dried milk samples. The real-time PCR protocol[17] of was applied as follows. Cells were pelleted from a 24 h culture of each isolate by centrifugation at 5000 rpm for 10 min. The cell pellet was re-suspended in PrepMan Ultra (Applied Biosystems, Foster City, CA, USA) and heated at 100ºC in a thermal block incubator for 15 min, followed by cooling for 2 min at room temperature, and centrifugation at 5000 rpm for 2 min. Resultant supernatants containing DNA were collected and used for real-time PCR reactions. A PCR reaction mixture of a total volume of 50 µL was

formulated using a 5 µL DNA sample template, 25 µL of TaqMan Universal PCR Master Mix (Applied Biosystems), 5 µL of forward primer, 5 µL of reverse primer, 5 µL of TaqMan probe, and 5 µL of water. The primers and TaqMan probe were designed to target a DNA sequence of 78 bp within the macromolecular synthesis (mms) operon[17] for 2 min, followed by 95 °C for 10 min, and 50 cycles of 95 °C for 15 s and 60 °C for 60 s. PCR reactions were conducted using a StepOne real-time PCR system (Applied Biosystems).

Assessment of the antibiotic resistance of Cronobacter spp.: Cronobacter spp. isolates were examined for their resistance to 10 antibiotics, including ampicillin (10 µg), penicillin G (100 unit), gentamicin (10 µg), tetracycline (30 µg), ciprofloxacin (5 µg), kanamycin (30 µg), streptomycin (10 µg), chloramphenicol (30 µg), nalidixic acid (30 µg), and cefoxitine (30 µg). Antibiotic resistance was tested using the Kirby-Bauer disc-diffusion method. Briefly, a standardised inoculum of a 24 h culture of each isolate was spread onto Muller-Hinton agar (Oxoid), followed by dispensing antibiotic-impregnated discs. After incubation at 37º C for 24 h, the diameter of the inhibition zones around each antibiotic disc was measured and interpreted as resistance, intermediate, or sensitive, according to the criteria of the Clinical and Laboratory Standards Institute.[18]

Results

Presence of Cronobacter spp. in powdered infant milk formulas and dried milk products. The prevalence of Cronobacter spp. in powdered infant milk formulas (PIMF) and dried whole and skim milk samples collected in March 2013 from the local markets in Saudi Arabia was examined.

Table 1: Detection of Cronobacter spp. in powdered infant milk formulas and dried milk samples

Product	No. of samples	No. of presumptive *Cronobacter* spp. positive isolates	No. of bio-chemically confirmed isolates (%)*	No. of real-time PCR confirmed isolates (%)*	Minimum Ct	Maximum Ct	No. of positive samples (%)
Powdered infant milk formulas	20	5	2 (40)	2 (40)	15.8	20	2 (10)
Dried whole milk	20	10	4 (40)	4 (40)	19.8	25	4 (20)
Dried skim milk	20	0	0	0	-		0
Total	60	15	6 (40)	6 (40)			6 (10)

A total of 15 potential isolates of the organism producing typical colonies on the DFI agar, a negative Gram reaction, and a yellow pigment on the TSA were recovered from these samples (Table 1).

However, only 40% of these isolates could be confirmed by biochemical testing using the miniaturised rapid ID 32E kit and a real-time PCR assay targeting the mms operon (Table 1 and Figure 1).

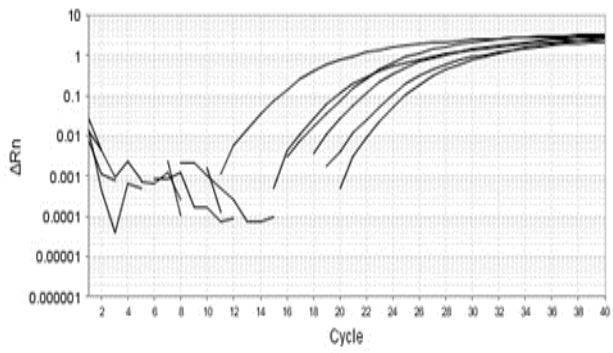

Figure 1: Real-time PCR analysis of Cronobacter spp. Isolates.

Figure 1 shows real-time PCR curves resulting from the analysis of the Cronobacter spp. isolates recovered from the PIMF and whole milk powder samples. Ct number is inversely related to the amount of amplicon in the reaction (target) whereas the lower the Ct, the greater the amount of amplicon[9]. This was reflected here where the number of isolates in the powdered infant milk formulas and dried whole milk were 2 and 4 which correspondent to the Ct values 17.9 and 22.4 respectively.

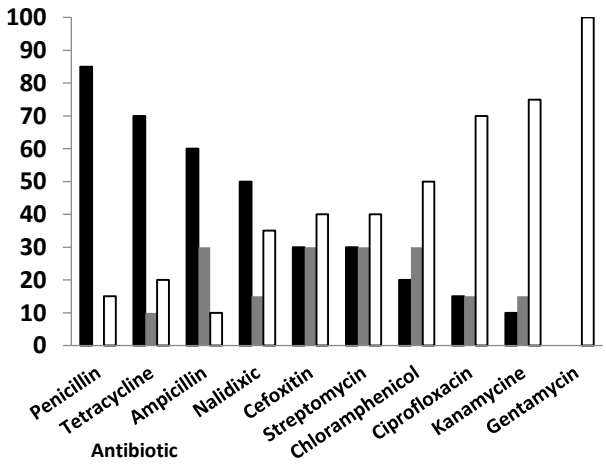

Figure 2: Response of Cronobacter spp. Isolates Isolates showed variable rates of resistance (■), intermediate response (■), and sensitivity (□) to the examined antibiotics.

Antibiotic resistance of Cronobacter spp. Isolates: Among the examined products, 10% and 20% of PIMF and dried whole milk samples were found to be contaminated with Cronobacter spp., respectively (Table 1). Dried skim milk samples were found free of the organism.

The susceptibility of Cronobacter spp. isolates recovered from PIMF and dried whole milk samples to the 10 antibiotics was examined. With the exception of gentamycin, Cronobacter spp. isolates showed variable resistance to the examined antibiotics (Figure 2).

Discussion

The highest resistance was found against penicillin, followed by tetracycline, with a resistance rate of 85% and 70% of the isolates, respectively. Resistance to other antibiotics ranged from 10% to 60% of the isolates. These results were consistent with those of Farmer et al.[19], who reported resistance to penicillin in all examined Cronobacter spp. cultures isolated from clinical samples.

Kilonzo-Nthenge et al.[20] also showed that the highest antibiotic resistance rates in Cronobacter spp. isolates recovered from domestic kitchens were found against penicillin followed by tetracycline. The authors have also found the isolates to be susceptible to gentamycin. However, they reported a higher resistance to ciprofloxacin of 57% of the isolates compared to the present study (15%), reflecting the effect of

the isolate source on its antibiotic resistance pattern.

Cronobacter spp. isolates recovered from PIMF and dried whole milk samples examined in this study showed both single antibiotic resistance and multidrug resistance to more than two antibiotics. Multidrug resistance was observed against penicillin, tetracycline, and streptomycin. Previous studies demonstrated multidrug resistance to various combinations of antibiotics in Cronobacter spp. isolates cultured from an adult patient with a wound infection and from domestic kitchens.[20-21]

Despite the assumption that Cronobacter spp. infections can be eradicated using antibiotics, the present study confirms the results of other previous reports showing that the pathogen may be able to resist several effective antibiotics. This raises concern regarding the use of antibiotics to treat these infections that could possibly lead to serious illnesses, including meningitis. Drug resistance in foodborne bacteria has been frequently linked to the abuse of antibiotics in feeding animals.[22] In addition to complicating medical treatments, antibiotic-resistant foodborne pathogens could serve as a reservoir spreading genetic elements of antibiotic resistance to other bacteria in the human gut.[23]

These results indicated the importance of employing biochemical and molecular identification testing for reliable detection of Cronobacter spp. This is consistent with previous reports demonstrating the value of incorporating the rapid ID 32E system and real-time PCR analysis in the detection protocols of Cronobacter spp. in PIMF and other related products.[24-25]

Conclusion

In conclusion, the present study demonstrates the association of the emerging pathogen Cronobacter spp. with PIMF and whole dried milk in Saudi Arabia. It also reports variability in the prevalence rates of the pathogen in these products compared to the rates in other regions. The study highlights the ability of Cronobacter spp. isolates to develop both single and multidrug resistance, which raises concern regarding the effectiveness of available antibiotics to combat serious illnesses associated with Cronobacter spp. infection. This requires further research in order to develop more effective antibiotics and/or alternative therapeutic strategies.

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ORIGINAL ARTICLE

Fast Food Consumption among University Students, Saudi Arabia A Cross Sectional Study

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Abstract

Introduction: Fast food consumption (FFC) is one of the most common eating habits nowadays with escalated prevalence in the recent decades. The study aimed to find the prevalence of FFC among the University students, to identify the factors that contributes to the FFC among them, and to test student's level of awareness regarding the health issues occur due to the consumption of fast food. **Methodology:** A total of 505 students (325) males and (180) females aged between 18-26 years were randomly chosen from Colleges of Majmaah University. **Results.** 41.6%) of the participants choose fast food as their usual meal. Male students consumed fast food as a usual meal more and female students were attracted more by taste and advertisements. Consuming fast food and staying away from the family was significantly more in male students as compared to female students. **Conclusions:** The prevalence of fast food consumption among Majmaah University students is very high.

Key Words: Fast food consumption, University students, World health organization, electronic media.

الملخص

مقدمة: تناول الوجبات السريعة هي واحدة من العادات الغذائية الأكثر شيوعا في الوقت الحاضر مع تصاعد معدل انتشارها في العقود الأخيرة. تعد الوجبات السريعة أحد عوامل الخطر العديد من الأمراض، وقد لوحظ ان الخطر يزداد مع الزيادة في استهلاك الوجبات السريعة. أهداف: تهدف هذه الدراسة لمعرفة نسبة انتشار تناول الوجبات السريعة بين طلاب جامعة ماجمعة كذلك تحديد العوامل التي تساهم في استهلاكها بين هم، واتجاهاتهم نحو الطلب بسبب أن الاضرار الصحية التي تحدثها نتيجة لاستهلاك الوجبات السريعة. **الطريقة:** هذه دراسة قطعية من يناير 2013 مايو 2014 تشمل عينة الدراسة الطلاب الذين يدرسون في جامعة ماجمعة من الجنسين. شملت الدراسة ما مجموعه 505 طالبا (325) من الذكور و (180) من الإناث الذين تتراوح أعمارهم بين 18-26 عاما تم اختيارهم عشوائيا من كليات جامعة ماجمعة. **النتائج:** كان ما مجموعه 41.6٪ (159) من المشاركين ذكور، 51 إناث يعتبر الوجبات السريعة هي الوجبة اليومية المعتادة. وقد لوحظ ارتفاع هذه النسبة من قبل الطلاب مقارنة مع الطالبات (P <0.001). كذلك بينت الدراسة ان العائلات تجذب الطالبات الوجبات السريعة أكثر من الطلاب (P <0.001). **الاستنتاج:** ارتفاع معدل تناول الوجبات السريعة بين طلاب جامعة ماجمعة. حيث كان أكثر من ربع المشاركين يستهلكون بشكل يومي الوجبات السريعة تعد هذه النسبة مرتفعة ويشكل قلق كبير يستدعي معالجة ذلك وزيادة الوعي لدى طلاب الجامعة حول آثار الصحية الناجمة عن استهلاك الوجبات السريعة.

Introduction: The term "fast food" was recognized in a dictionary by Merriam–Webster in 1951.[1] Fast food is a term given to food that can be prepared and served quickly. Usually it is a term given to junk food or food preheated or precooked. It is one of the largest influences on the community as a whole especially on children, teens, and even adults.[2] It is believed that people who consume fast food on daily basis lacks good nutrition and physical condition. Fast food is definitely a problem that concerns us as a society.[3] The fast food market

in Saudi Arabia is expected to reach $4.5 billion in gross sales by 2015, driven by growing demand from its population,[4] while obesity considered as a risk factor for many disease, consumption of fast food are reasons for increasing prevalence of obesity.[5] One study in United States reported that during 2007–2010, adults consumed, on average, 11.3% of their total daily calories from fast food; the highest percentage of calories from fast food was consumed among adults who were aged 20–39.[6] While in Saudi Arabia there are not clear statistics about consumption of fast food, but one news indicate that the rate of consumption of fast food among Saudi families reached 85% daily.[7] Available studies in Eastern Mediterranean countries indicate that fast food related disease like obesity has reached at an alarming level among both children and adults.[8] Another study conducted in Karachi, Pakistan, revealed that 58.3% students were of normal weight and 41.7% were overweight. In-parallel with the rapidly developing technology, eating habits also undergo changes. Although nutrition is important for all segments of the society, it is of a different importance for university students.[9] Individuals, who gain independence in this period, start to decide on their eating preferences, to eat out more frequently and to get influenced by their circle of friends more. Therefore, they tend to consume those foods that are deemed unhealthy such as fizzy drinks and fast-food more. Fast-food has become a significant symbol for the modern culture as it satisfies people in a relatively short time.[10] College students are highly exposed to unhealthy eating habits leading to body weight gain.[11] According to WHO, obesity is generally more common among women than men.[12] Therefore, we planned this study to determine the prevalence of fast food consumption among Colleges' students; to associate gender with factors that leads to fast food consumption and to measure the level of awareness in association with gender about fast food consumption effects in students studying at Almajmaah University.

Methodology

It was an observational cross-sectional study conducted in Majmaah University, the main campus is loacted in Majmmah City and has branches in other cities like, Alzulfi, Alghat, Hotatsudair, Ushirat Sudair, Rumah, and others. The study was conducted from December 2013 - May 2014. The target population was students of either gender studying in Majmaah University. A total of 505 students (325) males and (180) females aged between 18-26 years were randomly chosen from Colleges of Almajmaah University. The data was collected by Simple random sampling, using computer generated list Using direct investigation method. The questionnaire was adapted from study of "Consumption of Fast Food among the students of Faculty Technology at University Malaysia Pahang" and was validated by pilot study. Prior to filling out the questionnaire, the students were informed about the study and were given

instructions about how to fill out the questionnaire completely and truthfully. Ethical approval was also soughted from Department of Essential and Health Sciences Research Center at Majmaah University. The data entered and analyzed by using SPSS 22.0. Mean±S.D is reported for quantitative variables like age etc. Frequencies and percentages are reported for qualitative variables. Pearson Chi-square and Fisher Exact test were applied to observe associations between qualitative variables. A p-value of <0.05 was considered as statistically significant.

Results

The prevalence of fast food consumption among Majmmah University students was calculated on basis of two parameters; as a usual meal and weekly consumption. Two hundred ten participants (41.6%) choose fast food as their usual meal.

Fast food as a usual meal was consumed more by male students as compared to female student (p<0.001). Majority of the students 430 (85.15%) were consuming fast food at least once a week. Two hundred and one (39.8%) of the participants (137 males, 64 females) were consuming fast food 2-3 times a week. Sixty (11.9%) of the participants (54 males, 6 females) were consuming fast food 4-5 times a week. While 65 (12.9%) of the participants (55 male, 10 female) were consuming fast food more than 5 times per week.

Table1: Fast food consumption among affected population.

Type of disease	Yes	No
Obesity	395 (78.2%)	192(38%)
Hypercholesterolemia	183 (36.2%)	322 (63.8%)
Heart Disease	137 (27.1%)	368 (72.9%)
Diabetes	131 (25.9%)	374 (74.1%)
Hypertension	88 (17.4%)	417 (82.6%)
Gallstones	35 (6.9%)	470 (93.1%)
Arthritis	30 (5.9%)	475 (94.1%)
Sleep Apnea	24 (4.8%)	481 (95.2%)
Others	19 (3.8%)	486 (96.2%)

Weekly consumption of fast food was more by male students as compared to female students (p<0.001). About factors that leads to fast food consumption, we asked questions about: Distances of restaurants, taste, advertisements, lack of cooking skills, time limitation, prices, friends, and staying away of family. Significant association was observed between gender of participants and taste (p<0.001), showing that female students were attracted by taste more than male students.

Female students were attracted to advertisements more than male students (p<0.001). Consuming fast food and staying away from the family was significantly more in male students as compared to female students (p<0.001). We also tried to measure the level of awareness among our participants regarding fast food consumption. About knowing of diseases

that fast food may cause 273 (54.1%) of participants knew about it.

Table 2: Major factors affecting fast food consumption.

Factor	Yes	No
Are Restaurants near?	313 (62%)	192(38%)
Restaurants Distance Effect	304 (60.2%)	201 (39.8%)
Taste	218 (43.2%)	287 (56.8%)
Friends	168 (33.3%)	337 (66.7%)
Time Limitations	151 (29.9%)	354 (70.1%)
Staying away of Family	119 (23.6%)	386 (76.4%)
Advertisements	86 (17%)	419 (83%)
Lacking of Cooking Skills	66 (13.1%)	439 (86.9%)
Prices	58 (11.5%)	447 (88.5%)

Majority of the students 395 (78.2%) responded that obesity is a major disease caused by consumption of fast food, followed by one quarter of the students who said hypercholesterolemia and about one fifth of the students said diabetes, hypertension and heart disease. Significant association was observed between gender of participants and knowing about diseases, $p<0.042$, showing that female students knowledge about diseases that fast food may cause was more than male students.

No significant association was observed between Gender and knowledge about natural information and knowledge about ingredients on choosing fast food meals. About trying to lower or stop fast food consumption, 434 (85.9%) students answered "yes", whereas, 68 (13.5%) of the students said they will not stop or try to lower their fast food consumption.

Discussion

Our study revealed that the prevalence of fast food consumption among Almajmaah university male and female students is high. In our study 85.15% of the students aged 18 to 26 years went to fast-food restaurants at least once per week. Our study is the first of its kind in the Kingdom which aims to determine prevalence of fast food consumption among important bridge of the community i.e. university students. A cross-sectional study conducted at Rass, Qassim University, Saudi Arabia[14] revealed that 21.8% of the students were overweight and 15.7% were obese with strong association to the dietary habits including fast food consumption, but it differs than our study as the prevalence in 85.15%. In another similar study[15] on frequent consumption of fast foods, low servings per day of fruits, vegetables, milk and dairy products, frequent consumption of sweets, candy and carbonated drinks was mild to moderate, but in our study prevalence is much higher. That may be because it was conducted on college students who are usually busy with educational activities with limited time, more responsibilities resulting in more exposure to fast food. Another study conducted in Dammam, Saudi Arabia[16] revealed that fast food rich in fat and calories from restaurants was popular among majority (98.2%) of the students. In our study, the prevalence is also high as it involves young

female students with almost same circumstances. Yet another study conducted on association between fast-food consumption and obesity in Michigan adults[17] showed that 80% of adults went to fast-food restaurants at least once per month which is as high prevalence as in our study because of similar age groups, educational activities and family issues. We compared our results related to reasons for eating fast food with a relatively similar study conducted in 2009;[18] the distance from the restaurant (60.2% Vs 71%), the taste (43.2% Vs 69%), sitting with friends (33.3% Vs 31%), limited time (29.9% Vs 46.8%) and being away from family (23.6% Vs 21%) advertisements (17% Vs 47%). In our study when gender differences were compared in relation to fast food consumption and nutrition self-assessments, female students' significantly strongly agreed with the supra stated statements than males, when this compared with a study[18] conducted in 2008 no significant association was observed. Regarding knowledge about the diseases that fast food disease may cause, females significantly knew about it more than the males ($p>0.001$). When the classification of diseases were studied: fast food causes; obesity was reported by (78.2%) of the participants, hypercholesterolemia (36.2%), heart diseases (27.1%), diabetes (25.9%), hypertension (17.4%), gallstones (6.9%), arthritis (5.9%) and sleep apnea (4.8%). When these results were compared to a study conducted in Bangladesh[18] approximately 98% students were concerned about the negative effects associated with fast food consumption, and 60% pointed out obesity and weight gain as the most prominent consequence of excessive fast food consumption. About trying to lower or stop fast food consumption a total of 85.9 % want to reduced, lower, or stop their fast food consumption. No similar study was found to compare our results with.

Recommendation

We recommend to the fast food restaurants; to offer alternative meals with more healthy/natural components; awareness among the community should be developed related to diseases that fast food consumption causes, for this help from print or electronic media may be soughed.

Conclusion

The prevalence of fast food consumption among Almajmaah University students is very high. More than one quarter of the participants were consuming fast food daily which itself is alarming. Some intervention awareness programmed should be conducted to minimize the harmful effects of fast food consumption.

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REVIEW ARTICLE

Athletic Pubalgia – A Review of Literature.

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Abstract

Athletic pubalgia is commonly seen in sports that require athletes to perform repetitive kicking, cutting, pivoting and sharp turns such as soccer, cricket, rugby, ice hockey etc. It is caused by immoderate and disproportionate application of shear forces through the common attachments (pelvic) of the abdominal muscles and hip adductors. At present, there is no unanimity of opinion about the constituents of this diagnosis. Since it is not easy to define a clear diagnosis that is based on physical examination, methods such as ultrasonography and MRI are commonly used to rule out the existence of other conditions. Though surgeries are better than traditional treatment, laparoscopic surgery has a shorter recovery time as compared to open surgeries. This article summarises the present data regarding anatomy, biomechanics, clinical presentation, differential diagnosis, conservative treatment, preoperative and post-operative rehabilitation of athletic pubalgia. The information obtained from such a research work will help in understanding pathogenesis in a better way, build-up evidence-oriented screening and check for better surgical methods and effectively manage both post-surgical and conservative rehabilitation.

Key Words: Abdominal Muscles, athletes, laparoscopy, physical examination, running.

الملخص

فتق عند الرياضيين عادة ما يحصل في ألعاب الرياضية التي تتطلب أداء متكرر من الحركات مثل الركل وتغيير الاتجاهات والدوران بشكل حاد وسريع مثل لعبة كرة القدم، والرغبي، والكريكيت، ولعبة الهوكي على الجليد. وتكون ناتجة عن تعرض عضلات الحوض والفخذ الداخلية والبطن لقوة مفرطة وغير متناسبة مع قوة هذه العضلات في التقاء الحوض، لا يوجد إجماع في الرأي حول مكونات هذا التشخيص. ونظرا لأنه ليس من السهل تحديد تشخيص دقيق يعتمد على الفحص السريري فان عدة طرق أخرى مثل الموجات فوق الصوتية والتصوير بالرنين المغناطيسي يستخدم لاستبعاد وجود إصابات او امراض أخرى. على الرغم من ان العمليات الجراحية هي أفضل من العلاج التقليدي، الا ان وقت الشفاء للجراحة بالمنظار أقصر من العمليات الجراحية المفتوحة. هذا المقال يلخص البيانات الحالية المتعلقة بالتشريح، الميكانيكا الحيوية، الطرق السريرية، التشخيص التفريقي، العلاج غير الجراحي والجراحي، والتأهيل قبل وبعد الجراحة للفتق عند الرياضيين. ان هذه المعلومات التي تم الحصول عليها من الأبحاث العلمية ستساعد في فهم مصدر وتطور هذا المرض او الإصابة بشكل أفضل، وبناء أدلة مبنية على التشخيص والفحص الدقيق للتحقق من الأساليب الجراحية الأفضل، وأفضل طرق التأهيل لغير الجراحية والتأهيل بعد العمليات الجراحية.

Introduction

Athletic pubalgia, also known as Sports hernia or Gilmore's groin is commonly seen among the athletes who perform repetitive high speed kicking, turning or pivoting commonly seen in cricket, tennis, basket ball and most frequently soccer and hockey.[1-5] Athletic pubalgia refers to the chronic pain in the inguinal or pubic-area which is present with exertion and not explainable preoperatively by a palpable hernia or other medical diagnosis.[6] It may be unilateral or bilateral depends up on the location of pain and there may be associated medial thigh symptoms related to the adductors of the hip.[3,7] It has been reported among 5% to 28% of athletes[9] and most commonly diagnosed among

male athletes.[8] Around 2% of female athletes have been diagnosed with athletic pubalgia.[8] This variation in the incidence of pubalgia may be because of the anatomical differences between male and female rather than participation.[10] Females have a wider pelvis which makes more effective force distribution to the lower body[11] and the strength variation also makes contribution to high incidence of pubalgia among males. Literature is filled with complicated and by and large conflicting information regarding the cause, medical presentation, diagnosis, and management of sports hernia in athletes.[1,4] It is important that the clinicians should have a thorough knowledge about the condition as there is a high chance of misdiagnosis.

Applied Anatomy and Biomechanics**:** Rectus abdominus makes a conjoined tendon with transversus abdominus muscle and insert at or near the pubis. Across from these two muscles, and directly opposing their forces, is that the adductor muscle longus. Rectus abdominis muscle originates from the upper part of the symphysis pubis, with distinction often able to be made between a lateral and a medial head on both sides. Inferiorly, the medial head blends with its contralateral fellow; however, superiorly the medial heads diverge and are separated by the linea alba. The rectus abdominis has a sheet like configuration,[12] with a minimum of three intramuscular tendinous intersections, one at the level of the umbilicus, one at the xiphoid tip, and one between these two intersections. Sometimes, a fourth intersection may be present inferior to the umbilicus. The intersections extend through only to the anterior surface of the muscle, where they blend with the anterior rectus sheath. This latter structure covers the complete anterior aspect of each rectus abdominis and attaches onto the periosteum of the pubic bone anterior and adjacent to the rectus abdominis origin. The adductor muscle longus and adductor muscle brevis possess an extensive insertion on the femur. Combined with the insertion of the gracilis onto the tibia, these three tendons converge superiorly and obtain an origin close to each other on a narrow portion of the pubic body just lateral to the symphysis.

The adductor muscle tendon has its origin almost directly in line with the origin of the more superiorly placed tendon of the rectus abdominis, with the superficial fibers of these two tendons in direct continuity, coursing over the pubic crest. Farther posteriorly and slightly laterally lies the origin of the adductor muscle brevis. Some of the medial fibers of the adductor muscle longus and adductor muscle brevis tendons attach directly onto the symphyseal capsular tissues and intra articular disk.[13] When an athlete suffers a sports hernia, these opposing forces (upward pull from conjoined tendon and downward pull from adductor longus) cause disruption of the muscles at their insertion site (pubis), leading to groin pain. What happens is

that in repetitive kicking, pivoting or turning at high speeds the conjoined tendon exerts upward force and rotates the trunk, and the adductor muscle longus exert downward force and rotate the upper leg. The application of these excessive amounts of force in an imbalanced manner causes Athletic pubalgia. Often, the core muscles are less developed than the lower extremity muscles and disruption disproportionately involves the conjoined tendon leading to athletic pubalgia.

Signs and Symptoms: Athletic pubalgia is commonly seen among males than females. Most of the time the onset is insidious and in some cases an initial sudden tearing sensation may be felt. Pain is usually exercise related and felt on the lower side of the rectus abdominis muscle and it may radiate toward the testicular area, supra pubic region or adductor region. The pain may get aggravated by a sudden acceleration, cutting or even cough or sneezing. There may associate stiffness along with pain and it may persist for more than two to four days after competition. Localized tenderness at or above pubic crest of the effected side and pain will be present during resisted sit-ups. Resisted hip abduction will be painful and a painful squeeze test in supine position or 90º hip flexion position.

Diagnosis: The following criteria required for a diagnosis of athletic pubalgia includes: a clinical setting of chronic groin pain which develops during exercise, is felt over the lower lateral side of the rectus abdominis muscle with or without radiating to the testis or medial thigh muscles, and is aggravated by sudden acceleration, cutting and kicking, pivoting, sit-ups and coughing or sneezing; Subtle but consistent physical examination findings (Physical examination will not find an actual hernia, even though most of these signs and symptoms lead health care professionals to believe that one is present).[10,17-21] The Valsalva maneuver, along with muscle testing of the hip adductors, rectus abdominis, rectus femoris, and iliopsoas, will produce some discomfort.[20] Differential diagnosis has to be done to rule other causes of groin pain and appropriate imaging features. All of these criteria must be simultaneously present, because: (1) there are numerous other potential causes for groin pain in athletes; and (2) asymptomatic direct inguinal hernias are common in the general population.[22]

Differential diagnosis: Adductor Longus Tendinosis and Tenoperiostitis: It usually occurs with persistent overuse of the adductor longus muscle.[23] Adductor tendinosis is generally related to a rectus abdominis–adductor muscle longus aponeurotic injury. However, these type of injuries can be treated conservative management. The most common area of injury is proximal myotendinous junction. Pain and discomfort is in the upper medial thigh may get worsened by a resisted adduction of the hip and a tenderness can be felt on the proximal part of the tendon. The MRI shows thickening of the

adductor muscle longus tendon on the affected area, intra-tendinous tear, calcification, tendon avulsion, or a higher-grade and more distal adductor strain.

Osteitis Pubis: It is believed to result from instability of the pubic symphysis because of chronic repetitive shear and distraction injuries and unbalanced tensile stress from the muscle attachments of the pubic symphysis. The biomechanical changes leads to an inflammatory response, with osteitis and periostitis. Onset of pain over the pubis that may cause referred pain in the suprapubic region, adductor origin, and groin. Radiographs of the pubic symphysis may show subchondral sclerosis, symphyseal irregularity, and bone resorption.[24] MR images show diffuse marrow edema extending from the subchondral plate and often involving both pubic bodies.[25,26] In addition, periostitis, erosions, irregularity in articular surface, anterior and posterior osteophytes, and subchondral cysts may also be seen on MRI.[27] The myotendinous attachments are preserved unless there is coexistent tendinopathy.[28] The marrow edema in an osteitis pubis extends across the entire anteroposterior dimension of the pubic body.

Hockey Goalie–Baseball Pitcher Syndrome: Groin pain in this unusual syndrome result from an epimysial or myofascial herniation of the adductor longus muscle belly several centimetres away from the site of its pubic attachment.[29] A number of authors have suggested a link with chronic repetitive stress at sites of neurovascular penetration.[30] Acute onset of pain is usually experienced by patients in this condition, which may be persistent or may intermittently increase after stretching. Physical examination often leads to the identification of a site of pain distal to the symphysis pubis, over the herniated muscle. Imaging findings shows edema of the adductor longus muscle belly, which can possibly occupy a central position in the herniated area, and a focal muscle bulge indicative of herniation.[31]

Pubic Stress Fracture: Fatigue fractures are usually seen in athletes, especially in long-distance runners who are supposed to reflect abnormal chronic repetitive stress that surpass the bone's capability to remodel itself. Inferior pubic ramus is the most common site of pelvic stress fracture; however, stress fractures of the femoral neck are more prevalent and may cause groin pain.[32] Risk factors for stress fracture include female sex, malnutrition, and changes in the training program that place a greater amount of stress on the bone. Patients usually present with a gradual onset of pain, which, at an initial phase of injury, is aggravated by exercise and relieved by rest. If pain persists even during rest, it indicates a more advanced phase of injury. On palpation, tenderness is usually present over pubic ramus.[33] MRI finding shows areas of marrow edema obtained with fluid-sensitive sequences. There is also a possibility that periosteal edema or calluses and edema in the

adjacent muscles and soft tissues are present in some cases.

Septic Arthritis–Osteomyelitis: Infection of the pubic symphysis is commonly seen in postpartum female patients, patients with pelvic malignancies and patients subjected to direct instrumentation of the pubic symphysis, but it is also seen in athletes without such risk factors.[34] The infection is most often caused by Staphylococcus aureus and may result from a hematogenous spread rather than direct inoculation. Patients usually present with fever and an acute onset of pubic pain that can radiate up to the groin. The radiographic and MRI features of pubic septic arthritis–osteomyelitis and osteitis pubis are identical, and clinicians may depend on the duration of symptoms and the presence of risk factors to help them distinguish between these possibilities. If the diagnosis is not definite, a biopsy test is desired.

Acetabular Labral Tear: There is complete overlap between the clinical manifestations of athletic pubalgia and the pathologic conditions associated with the hip. Some of the hip disorders which may result in groin pain are osteoarthritis, synovitis, intra-articular bodies, and acetabular labral tears. The ant-superior part of the labrum is quite vulnerable to injuries, particularly during external rotation and hyperextension.[35] The labrum is comparatively poorly vascularized and its anterior-superior aspect is actually considered to be particularly weak. Labral injuries predispose the hip to paced articular cartilage loss, especially near to the tear, a condition that is considered to be the cause of alterations and instability in contact forces of the articular cartilages.[34] Abnormal morphology and signal intensity of the labrum at routine MR imaging of the hip are indicative of the diagnosis. Paralabral cysts linked with acetabular labral tears can be clearly seen on the images obtained with fluid-sensitive sequences. Additionally, MR imaging plays its role in determining whether the morphologic features of the femoral head and acetabulum predispose a patient to labral tears and femoroacetabular impingement.

Internal Snapping Hip (Coxa Saltans): Internal snapping hip is a rare cause of pain in the inguinal region and anterior part of the hip. The musculo tendentious part of the iliopsoas muscle snaps with head and anterior capsule of the femur causing an obstruction to the movement. This chronic repetitive motion may leads to tendinosis and iliopsoas bursitis. Magnetic Resonance Imaging of the hip in a patient with internal snapping may seem to be normal, but iliopsoas bursitis is frequently present.[36,37] Intermediate intra substance signal intensity and Iliopsoas tendon thickening are rare findings, but when they are observed over the spinal process or iliopectineal eminence, they are indicative of the diagnosis. Lastly, an osseous spur budding from the iliopectineal eminence may predispose the patient to growing internal snapping. Ultrasonography is often helpful for

visualizing the tendon as it passes over the iliopectineal eminence during dynamic maneuvers in addition for detecting bursitis.

Osteoid Osteoma: Osteoid osteoma is a benign bone-forming tumor generally observed in the patients between the ages of 5-30 years. It is generally occurring in the long bones, specifically the tibia and femur and in the phalanges of the toes and fingers. Lesions that include the pubic bones may repeat the symptoms of athletic pubalgia. Osteoid osteomas may appear in medullary, cortical, subcortical or periosteal sites. They typically occur as a central radiolucent nidus with a varying degree of calcification, surrounded by different zones of cortical thickening in addition to non aggressive periosteal reaction. Intramedullary lesions as well as lesions within a joint capsule are often accompanied by a small amount of or no surrounding sclerosis due to the lack of contiguity with the nearest periosteum. CT and Radiography are generally diagnostic for osteoid osteoma and may be used to give direction to biopsy and treatments like percutaneous ablation.[38]

Nerve Entrapment Syndromes: Several nerves, including the femoral, obturator, iliohypogastric, genitofemoral, lateral femoral cutaneous nerves and ilioinguinal provide motor and sensory innervation to the upper thighs and groin. Entrapment of any of these structures may result in groin pain mimicking athletic pubalgia. Patients with obturator nerve entrapment, mostly present along with aching pain near the adductor origin which may radiate to the knee and also worsen during the exercise. The nerve entrapment has been attributed to fascial thickening of the adductor compartment, specifically along the anterior aspect of the adductor brevis.[39,40] Other possible causes of obturator nerve entrapment involve a mass effect from an obturator hernia a pelvic fracture, an obturator hernia and an acetabular paralabral cyst.[41,42] Femoral nerve entrapment has been diagnosed in patients after surgical procedures such as herniorrhaphy, hip arthroplasty, abdominal hysterectomy, entrapment of the genitofemoral and ilioinguinal nerves may be seen after abdominal surgery in muscle hypertrophy or in blunt trauma.[43] Although the nerves in this area are difficult to detect at regular MRI, it may be helpful for diagnosing entrapment. MRI findings of muscle denervation-related edema or atrophy with a characteristic pattern may be suggestive of entrapment of a specific nerve.

Apophysitis: There are several pelvic apophyses which may be injured by forceful or repetitive muscle contractions during athletic activities before complete skeletal maturity is achieved i.e. between the ages of 12 and 22 years. Groin pain mimicking athletic pubalgia may be present in inflammation of the apophyses of the anterior-inferior iliac spine, where actually the rectus femoris originates and the anterior-superior iliac spine at the originating point of the

Sartorius and the tensor fascia lata. Athletes who participate in sports involving frequent kicking have a tendency to develop painful apophysitis in such locations.

Urological disease: Other commonly seen causes of obscure groin pain include prostatitis,[44] urethritis, epididymitis and hydrocele.[45]

Connective tissue disease: Various connective tissue disease, such as rheumatoid arthritis should be rules out. Diseases such as gout, ankylosing spondylitis, Reiter's syndrome and other spondarthritides may also need to be investigated.[46]

Spinal and hip abnormalities: Early assessment of the spine and hip has to be done to identify sacrolumbar abnormalities and sinister lesions such as bone tumours. Old osteochondritis of the vertebral bodies, disc lesions at L1 or L2, and crush fractures can cause radicuar pain and imitate athletic pubalgia.

Imaging: Many authors suggest that Magnetic Resonance Imaging (MRI) is having a limited ability to identify a athletic pubalgia but it can be used to rule out any the alternative diagnoses; nevertheless others have prompted that Athletic pubalgia almost always show abnormalities in MRI.[47-51] The two clearly seen patterns of injury involve lateral rectus abdominis/adductor aponeurotic injury just near to the midline rectus abdominis/adductor aponeurotic plate injury[7] and external inguinal ring. Although some degree of pubic marrow enhancement is generally reported, these findings do not foretell which patients will gain from the surgery.[7]

Management: The initial stage of treatment for any kind of muscle injury generally includes rest, ice and proper compression. Resting is obviously needed to avoid any further deterioration or aggravation of the condition. Resting period can be anywhere from few weeks to months depending upon the condition's severity and application of ice to the injured area for about 10-15 minutes every four hours all over the day help in giving some relief in the swelling and pain caused by injury in Athletic pubalgia. Compression shorts and warm pants also play their role in controlling the symptoms of athletes who still have some time for surgical intervention. However, these may not decrease the symptoms of Athletic pubalgia, but certainly help in curbing worsening of tear until the time of surgical intervention. Anti-inflammatory medications like ibuprofen may also be consumed to reduce the swelling and pain.

Physiotherapy Management: The most important aim of physical therapy management is to reduce the time lost to the player due to injury and enhance the availability of the player to the team as soon as possible. Pre-season screening of the athlete especially flexibility, posture and gait is having a major role in prevention of these type of injuries. Once the assessment is done athlete should involve a rigorous training which is specific to each

individual. Early part of functional rehabilitation should be taught to the athlete in advance to the surgery so that the athlete should have an early understanding regarding the exercises following surgery.

More emphasis should be given on the stabilising role of the transverses abdominis, which is always neglected, internal oblique, gluteal muscles and adductors of the hip. In the late preoperative/early postoperative phase, more stress should be given in maintaining the neutral position of the spine. This requires time and a detailed explanation of what is needed during what appear to be quite simple exercises for the 'ill-informed' patient. It is important that the rehabilitation program should be sports specific or occupation specific. The medical team should have an excellent understanding regarding the demands of the sport/occupation.[52] Appropriate preoperative and postoperative care must allow a full return to activity within just four to eight weeks from the date of surgery. A good coordination between the treating clinicians and the physiotherapy team for the preoperative and postoperative rehabilitation is recommended.

Preoperative rehabilitation: Preoperative rehabilitation involves; postural, range of motion and strength assessment, strengthening of gluteal muscles, transvers abdominus, erector spinae and abdominal muscles, educating the patient regarding post-operative rehabilitation, core muscle strengthening by the use Swiss ball, medicine ball, pulleys etc.

Surgery: Once the non surgical management is found ineffective , surgery is a reasonable option. Athletic pubalgia surgery can be done with all three types (local anaesthesia, general or regional anaesthesia). Athletic pubalgia surgery centres on stabilizing the insertion of the conjoined tendon at the pubic tubercle. Additionally, superficial nerve is taken away because this nerve can get caught up with post-surgical scar and mimics the symptoms of Athletic pubalgia. In order to strengthen the inguinal floor a supportive mesh will be placed over the repair and extend through the inguinal canal. The incision will be around four to five centimetre length. In order to decrease post-surgical discomfort local anaesthetics will be given before closing of the incision. The initial Athletic pubalgia surgery does not take care of the discomfort at the adductor insertion site. If the conjoined tendon is sufficiently supported by the Athletic pubalgia surgery, adductor discomfort is can be treated in postoperative rehabilitation. Rarely does the adductor needs operative release. Other surgical techniques involves an altered Bassini repair, in this technique the transversal fascia from the deep to superficial ring was released. Intra operatively, all athletes were diagnosed for thinning and a variable degree of bulging of the posterior inguinal wall. The conjoined tendon used to be attached to the inguinal ligament in a double-

layer continuous suture, as against the interrupted original Bassini repair; with a running 2/0 prolene suture.[53] A concurrent percutaneous adductor release was done by an orthopaedic surgeon in all the cases. A bilateral tenotomy was done with complete transaction of the epimysial fibres of the adductor longus tendon which is two centimetre from the pubic insertion. For those who are having persistent adductor symptoms even after post surgical rehabilitation or for those whose major complain was related to adductor muscle, non-operative options do exist. Adductor problems, that are not responsive to physical therapy can be treated with Platelet-Rich Plasma injection, which is an office-based procedure. Post-procedure rehabilitation will be continued, and it is rare that a second injection is needed. This technique has replaced operative release of the adductor insertion.

Post Surgical Rehabilitation: Postoperative rehabilitation can be started with isometric exercises of abdominal muscles and muscles around the hip joint. Early spinal mobilization program can also be initiated. Increase walking using time as limiting factor, increasing by five minutes per day can be initiated from 2nd week onwards and active assisted exercises and isokinetic program in functional standing position can be incorporated at the end of week number.[2] Functional rehabilitation program by using gymnastic ball, mobility and stability exercises and the exercise to improve cardiovascular system can be started with from 3rd week onwards. Early sports/occupational specific rehabilitation program can be incorporated with the existing rehabilitation program in the 4th and 5th weeks of surgery. The person can return to normal activities/sports by 5th or 6th week according to the functional reassessment.

Conclusion

Timely recognition is crucial in case of injury diagnosis, which can be done through thorough examination of the injury. This may include palpation of the areas of concern and manual muscle testing to exclude the other possible conditions. Mostly, the patient will complain about chronic pain in the regions such as lower abdomen, pelvic region and thighs, which all radiates to the groin region. If a clinician encounters such complaints/symptoms, then, he/she should examine the patient for Athletic pubalgia. However, one needs to be aware about the fact that these findings will not confirm the diagnosis of Athletic pubalgia, so clinicians should have a thorough knowledge of the other conditions which may mimic the symptoms. Most imaging studies are only useful to exclude other diagnoses. Patient will typically not respond to conservative/non operative treatment, so we can switch over to surgical treatment if the patient does not respond to non operative treatment even after six weeks. Usually patient returns to his pre injury level

within 6 weeks after laparoscopic repair and within 1-6 months in case of an open repair.

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VIEWPOINT

Teaching Biostatistics to Medical Undergraduates in Integrated Curriculum

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Abstract

As medicine has moved to become more evidence based, biostatistics has become ever more important in practicing medicine and for the education of tomorrow's doctors. The role of biostatistics in medical education is now well recognized, and the curricula in almost all the medical colleges and postgraduate institutions across globe has provision of teaching biostatistics. In an integrated curriculum biostatistics and research methods, course should be inducted in-combination from 1st year of study and its Curricula should be developed by content experts with taking care of the spiral approach. Integration is now considered the best way to teach so the tutors should get maximum benefit of teaching biostatistics under this system. The curriculum contents should be updated at the end of course every time based on feedbacks and recent advancements in the field. Computer based approach should be used to make the learning more interactive. Assessment must be aligned with teaching methods, curriculum outcomes and course objectives.

Key Words: Biostatistics, Research Methods, Integrated Curriculum, Computer Based Approach

الملخص

كما هو معلوم بأن الطب أصبح يعتمد على البراهين فقد أصبح الإحصاء الحيوي أهم من أي وقت مضى في ممارسة الطب وتعليم أطباء الغد. ومن المسلم به الآن دور الإحصاء الحيوي في التعليم الطبي والمناهج الدراسية في جميع الكليات الطبية والمؤسسات التي تمنح دراسات عليا في الطب في جميع أنحاء العالم. في المناهج المتكاملة، مقرر الإحصاء الحيوي ومناهج البحث ينبغي أن يدخل في المناهج من السنة الأولى للدراسة والمناهج ينبغي أن توضع من قبل خبراء التخصص مع الأخذ في الاعتبار المقاربة الحلزونية للمناهج. ويعتبر التكامل الآن أفضل وسيلة للتعليم ولذلك فإن المعلمين يجب أن يحصلوا على الفائدة القصوى من تدريس الإحصاء الحيوي في ظل هذا النظام. يجب أن يتم تحديث محتويات المنهج الدراسي في نهاية كل مقرر على أساس التغذية الراجعة والتطورات الأخيرة في هذا المجال. وينبغي استخدام الكمبيوتر لجعل التعلم أكثر تفاعلية. التقييم يجب أن يكون متوافقا مع طرق التدريس ومخرجات المنهج وأهداف المقرر.

Introduction

Prior to the twentieth century, medical research was primarily based on empirical evidence and anecdotes. As the medicine has moved to become more evidence based, biostatistics has become ever more important in practicing medicine and for the education of tomorrow's doctors.[1] Biostatistical reasoning and modeling were of critical importance to the foundation theories of modern biology. In the early 1900s, after the rediscovery of Mendel's work, the gaps in understanding between genetics and evolutionary Darwinism led to vigorous debate among biometricians. Statisticians then built models on statistical reasoning that helped to resolve these debates.[2] The role of biostatistics in medical education is now well recognized, and the curricula in almost all the medical

colleges and postgraduate institutions across globe has provision of teaching biostatistics[3] irrespective they are following traditional curriculum or integrated curriculum. The concept of integrated curriculum is nothing new. It's been around, in fact, since the 1800s and was advocated by well-known educational theorists (John Dewey and Meredith Smith). It has gained recent attention and most modern medical educationists think that it is the best way to teach.[4-5]

Biostatistics is a branch of applied statistics that is concerned with the application of statistical methods to medicine, clinical trials, demography, epidemiology, population estimation, modeling, community diagnosis and surveys.[6] Biostatistics is now considered as an essential tool in planning and delivery of health care systems. Integration is defined as a way to teach students how to break down barriers between subjects and make learning more meaningful & attractive. Integrated curriculum is an effective way to teach and learn because it corresponds with the way our brain works physiologically. According to M. Markus,[7] integrated curriculum is a great gift for experienced teachers. It's like getting a new pair of lenses that make teaching a lot more exciting and help us look forward into the next century.

Biostatistics is now being taught as a major subject in the medical curriculum. In a traditional curriculum, generally the course of biostatistics is spread over one academic year study with formal final assessment. However, in an integrated curriculum it is generally taught as a longitudinal course spread over 4 – 6 months semester with either a formal final assessment or submitting a research project that depicts the knowledge of students. In this article, we will focus on "how biostatistics subject should be taught to undergraduate medical students in an integrated curriculum".

Biostatistics Course Induction Time in an Integrated Curriculum: At undergraduate level, there is a great difference in terms of organization of teaching and time allotted for biostatistics teaching in medical colleges globally. In United States, Canada, Australia and United Kingdom biostatistics is being taught in 1st and 2nd year of study.[8] In an integrated curriculum, the best time to start teaching biostatistics should be from 1st year of education, and biostatistical applications should be reinforced throughout during the basic sciences phase followed by a research project as course's final assessment. The core benefit of inducting biostatistics from 1st year level will strengthen the scientific reasoning of medical students and as they will reach the end of initial 2 ½ years of study their knowledge level will have increased unprecedentedly. Contra to it, if biostatistics is taught in one semester continuously it might bore the students because they are forced to grasp too much of knowledge in a limited time and will be tougher if it is followed by submitting a research project.

Secondly, with other parallel full time running courses the students might focus more on those subjects rather than learning biostatistics.

Course of Biostatistics at Undergraduate Level in Integrated System: In an integrated system biostatistics and research methods, subjects should be taught in-combination. Students should be imparted with the biostatistical and research methods knowledge throughout their first 2 ½ years of education. Learning the subject in-combination will not only help medical students to grasp necessary knowledge at undergraduate level but will also help them to develop research–oriented thinking at postgraduate level.

Teaching Biostatistics in Integrated Curriculum: In this section, some guidelines are given for teaching biostatistics in an integrated curriculum which may help to enhance the learning in this subject. The tutor must convince the medical students about the importance of learning biostatistics subject. As integration is a student-centered approach, one of the best ways of motivating the students is to expose them to the medical literature with examples of uses & abuses of biostatistics.[9]

In an integrated curriculum, the instructional method(s) should be problem-oriented instead of technique-oriented. The technique-oriented method is now old style which contains hand calculations, formulas and drawing critical regions etc.[10] Besides, problem-based approach should be introduced which focuses more on interpretation. A survey conducted on biostatistics teaching showed that the students ostracized the subject because it was taught in the traditional way.[11]

Hand calculations should be avoided and for making the teaching interactive Computer based approach should be introduced. Nowadays a variety of biostatistical software's (SPSS, STATA, STATISTICA, NCSS and OPEN-EPI) are available. Introducing Computer Based Learning (CBL) will also enhance the student's motivation for learning. The use of computers in the teaching should be encouraged to allow the students to concentrate on the interpretation of the analysis.[12]

Reviewing literature is a pre-requisite for designing research. In an integrated curriculum, the tutor should educate the students about the methodology in searching literature and designing the research (research design, sampling technique / data collection and sample size etc). Moreover, the tutor should emphasize upon how results are interpreted and reported in biostatistical language.[13] Furthermore, the tutor should give special emphasis upon; how to write a research proposal and its scientific presentation. One of the main goals of teaching biostatistics is to analyze and interpret the data. In an integrated curriculum, it is the prime responsibility of the tutor to make the students understand about using accurate data analyzing technique(s).[14] The inappropriate use of

biostatistical methods & techniques may mislead the students understanding at a stage when their minds are fresh to grasp knowledge. The tutor should also strive to present a well-balanced combination of lectures, tutorials and practicals.[15]

Conclusion

In an integrated curriculum biostatistics and research methods, course should be inducted in-combination from 1st year of study. Curricula should be developed by content experts with taking care of the spiral approach. Students should be encouraged to conduct a research project of their own. Integrated curriculum is now considered the best way to teach so the tutors should get maximum benefit of teaching biostatistics under this system. The curriculum contents should be updated at the end of course every time based on students' feedback and recent advancements in the field. The computer based approach should be used to make the learning more interactive. Assessment must be aligned with teaching methods, curriculum outcomes and course objectives.

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MEDICAL NEWS

WHO Health Topic: Are we practice a safe health care?

All health care providers are dedicating themselves to provide a good health care to their patient with no harm, but remains the fact that patients are harmed daily in the course of receiving health care all over the world. Patient safety is a serious global public health issue. Estimates show that in developed countries as many as 1 in 10 patients is harmed while receiving care.

Patient safety has received increased attention in recent years, but mostly with a focus on the epidemiology of errors and adverse events, rather than on practices that reduce such events. Therefore, we need to address this fact and do our best to correct the problems that leads to unsafe practice, as all patients have a right to effective, safe care at all times. WHO considered patient safety as a fundamental principle of health care. Every point in the process of care-giving contains a certain degree of inherent unsafety. Adverse events may result from problems in practice, products, procedures or systems. Patient safety improvements demand a complex system-wide effort, involving a wide range of actions in performance improvement, environmental safety and risk management, including infection control, safe use of medicines, equipment safety, safe clinical practice and safe environment of care.

Recently, the solutions for insuring patient safety offer a more constructive approach; one important solution is the work of the caregivers together as a team, how effectively they communicate with one another and with patients, and how carefully the care delivery processes and supporting systems of care are designed. With the growing recognition of safety problems in health care, it is now time to create and disseminate “Solutions” for patient safety. WHO stated some guidelines on patient safety in some health practices, it is under the following headings:

- Best practices for injections and related procedures toolkit
- Blood donor selection
- Natural ventilation for infection control in health-care settings
- Screening donated blood for transfusion-transmissible infections: recommendations
- Towards 100% voluntary blood donation

- WHO guidelines on hand hygiene in health care

Not only that but also WHO published a Patient Safety Curriculum Guide under the title "The Multi-professional Patient Safety Curriculum Guide" It was released in October 2011and it promotes the need for patient safety education. The comprehensive guide assists universities and schools in the fields of dentistry, medicine, midwifery, nursing and pharmacy to teach patient safety. It also supports the training of all health-care professionals on priority patient safety concepts and practices.

The World Health Organization launched the World Alliance for Patient Safety and identified six action areas in 2005. One of these action areas is the development of "Solutions for Patient Safety". In the same year, the Joint Commission and Joint Commission International were designated as a WHO Collaborating Centre for Patient Safety Solutions, to initiate and coordinate the work of developing and disseminating solutions for patient safety. The output from this component of the World Alliance will be delivered to the global health-care community as "Patient Safety Solutions". Within the foregoing context, the term "Patient Safety Solution" is defined as: Any system design or intervention that has demonstrated the ability to prevent or mitigate patient harm stemming from the processes of health care.

Inaugural Patient Safety Solutions:

1. Look-Alike, Sound-Alike Medication Names
2. Patient Identification
3. Communication During Patient Hand-Overs
4. Performance of Correct Procedure at Correct body site
5. Control of Concentrated Electrolyte Solutions
6. Assuring Medication Accuracy at Transitions in Care
7. Avoiding Catheter and Tubing Mis-Connections
8. Single Use of Injection Devices
9. Improved Hand Hygiene to Prevent Health Care-Associated Infection

International patient safety goals:

- Identify patient correctly
- Improve effective communication
- Improve the safety of high alert medication
- Eliminate wrong site, wrong patient and wrong procedure surgery
- Reduce the risk of health care acquired infection
- Reduce the risk of patient harm resulting from fall

Fortunately, authorities in many countries are reforming health care in terms of higher quality and the elimination or correction of practices that are known to be unsafe or wasteful. Also let us not to forget the role of patients and their families in improving the patient safety, they are becoming increasingly skilled in accessing information to make personal health care decisions about treatments and their choice of providers, and demanding safer care as well. Health-care practitioners are also becoming more proficient at incorporating evidence-based knowledge into their clinical decision-making practices. One of the role of patients and their families in improving the safety is the patient advocates use past experiences to change the future, and here is an example of a lady who lost her son and she dedicated herself to advocate patient safety. When visiting a doctor, patients expect a listening ear, an accurate diagnosis and timely treatment. This woman encountered the opposite, a flawed health system that lacked the capacity to respond to her 21

years old son deteriorating health. His personality changed. He was moody and constantly tired. He consulted a doctor for persistent bone pain. Tests revealed high calcium levels and a plasma creatinine level indicating kidney failure. The results required immediate referral, which did not happen. Symptoms continued for another 2 years without action. On his last visit to his doctor, tests showed critically high levels of calcium in his blood, levels later described by peer reviewers as "inconsistent with life". The results were communicated by telephone and written on a post-it note by a nurse, who believed that the patient had hypercalcaemia. Ignoring the nurse's diagnosis, the doctor omitted any reference to calcium and only included results in his referral letter that supported the incorrect diagnosis. The post-it note was stuck to the back of the referral letter and was not seen by the hospital until 6 weeks after the patient death. Unaware of his high calcium levels, the patient was diagnosed with nephritis and transferred to another hospital for treatment. Because it was a weekend, on-call senior personnel were not advised of the patient's condition and an aggressive treatment plan was not started. Hours later, the patient suffered a heart attack and could not be resuscitated. His cause of death was primary hyperparathyroidism, multi-organ failure and hypercalcaemia. Calcium was being channelled into the patient's blood stream instead of his bones, putting strain on his heart. A simple surgery, with a 96% success rate, would have saved his life.

"Adverse events happen to real people," the mother says. "my son was more than a statistic; he was more than a medical condition. He was a real person, a young man, full of life. But above all, he was my beautiful boy."

In 2004, WHO launched a patient safety programme to develop policies and practices aimed at preventing harm to patients worldwide. Because the patient voice is essential to advocating for change, WHO also formed Patients for Patient Safety (PFPS) – a patient-lead, global network of patients and patient organizations who advocate for patient safety.

"Because patients and caregivers see things that busy health-care workers do not, it's essential for us to include them at the center of all the work we do."

"The patient is the single entity which is present throughout the full continuum of care," stresses Margaret. "A variety of professionals dip in and out of the care pathway, but the patient is the one constant and a useful resource in relation to diagnosis and treatment. Importantly, the patient is the individual with the greatest vested interest in the outcome."

MEDICAL QUIZ

Moattar R Rizvi, Assistant Professor, Physiology

An 18 years old female patient presents to the emergency department stating that over the past 24 hours, she has developed left sided facial weakness and drooping. Her mouth turns towards the side if she smiles and she is unable to close her left eye.

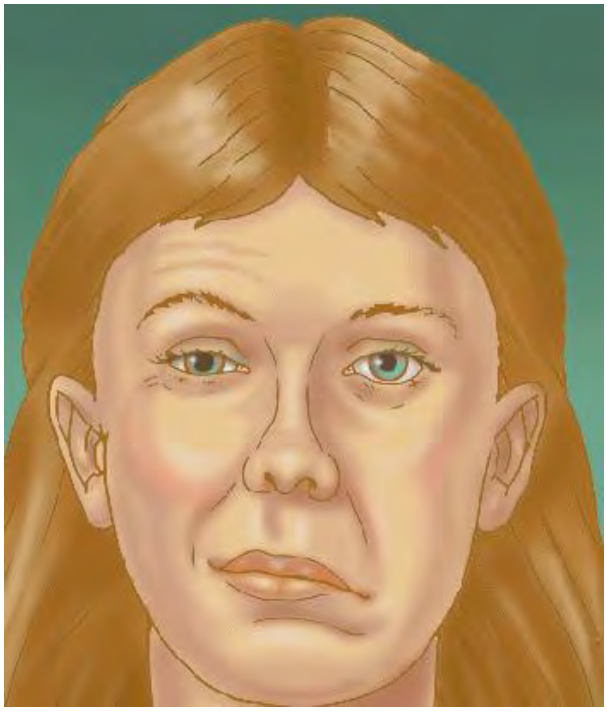
She also complains that she is unable to move both upper and lower side of her face. She stated that she has had a herpes simplex (viral) infection.

O/E of Vital signs –

Vital Measurements	Recorded values	Normal values
Blood Pressure (mm of Hg)	124/80	120/80–140/90
Temperature (°F)	98.1	97 - 99
Respiratory Rate (per min)	15	12 - 20
Pulse (per min)	78	60 - 100

Systemic examination was unremarkable and investigations like skull xray, CT and MRI were normal.

The physician diagnosed the case as Bell's palsy and prescribed an antiviral medication along with a short course of corticosteroids.



Depending on this case, please answer the below mentioned questions.

1. Bell`s palsy affects one of the following cranial nerves :
   a. Trigeminal
   b. Facial
   c. Glossopharyngeal
   d. Hypoglossal

2. This patient will complain of suppressed gustatory sensation from which of the following region:
   a. Anterior two thirds of the tongue
   b. Posterior one third of the tongue
   c. Epiglottis and pharynx
   d. All of the above

3. The muscles of mastication (chewing) are …… in Bell's palsy.
   a. Affected
   b. Unaffected (spared)
   c. Partially affected

4. Tactile sensation from the face will be unaffected in Bell's palsy.
   a. True
   b. False

5. The patient has complained of dry eyes (left eye). Which of the following options given below is the correct explanation?
   a. Impaired innervations of the lacrimal gland
   b. Inability to close the eyes leading to evaporation of tears
   c. Both of the above
   d. None of the above

Tick the correct statement:

a. Bell's palsy is due to lower motor neurone lesion. T F
b. Bell's palsy is idiopathic in nature. T F
c. The benefits of acyclovir is definitive on the patient T F
d. About 50% of people get better with no treatment T F
e. Gustatory sweating is a recognized complication T F

UPCOMING CONFERENCES

	Conference List	Date/Venue
Septembers, 2015	3rd International Oncology Conference	10 – 11 September, 2015, Abu Dhabi, UAE
	The 8th Pan Arab Radiology Conference (ARC 8) The 10th Jordanian Radiology Society Conference	10 - 13 September, 2015, Amman, Jordan
October, 2015	4th International Conference on Surgery	5 – 7 October, 2015, Dubai, UAE
	Mental Health Congress (WFMH 2015)	16 – 19 October, 2015, Cairo, Egypt
	3rd Annual Pediatric Surgical Innovation Symposium	23 October 2015, Washington, D.C., USA
	4th International Conference on Orthopedics & Rheumatology	October 26-28, 2015, Baltimore, USA
November, 2015	International Paediatric Medical Congress	12 – 14 November, 2015, Dubai, UAE
	The IRES – 31st International Conferences on Medical and Health Science (ICMHS)	16th to 16th November 2015 Riyadh, Saudi Arabia
	Abu Dhabi International Conference in Dermatology & Aesthetics	19 – 20 November, 2015, Abu Dhabi, UAE
	XXI. World World Congress of Echocardiography and Cardiology	20-22 November, 2015, Istanbul, Turkey
	1st Saudi Epidemiology Conference	November 24-26, 2015 Hotel Park Hyatt – Jeddah

	Global Summit and Medicare Expo on Head & Neck Surgery	November 30-December 01, 2015, Atlanta, USA
December, 2015	4th Saudi Heart Failure Conference	December 4, 2015 Jeddah, Saudi Arabia
	International Conference and Exhibition on Cosmetic Dermatology and Hair Care	December 7-8 2015, Philadelphia, USA
	3rd International Endoscopy Symposium	09-10 Dec 2015, Riyadh, KSA
January, 2016	International Conference On Infectious Disease	26-27 Jan 2016, Jeddah, KSA
	18th International Conference on Diet, Gut Microbiology and Human Health	January 26 - 27, 2016 Jeddah, KSA
February	12th International Conference on Medical and Biosciences (ICMBS)	22nd February 2016 Riyadh, Saudi Arabia
March, 2016	5th World Congress on Neurology and Therapeutics	March 14-16, 2016, London, UK
	7th World Cardiothoracic Meeting	March 29-30, 2016, Atlanta, USA
	Annual Pediatric Emergency Medicine Conference	March 29-31, 2016, Atlanta, USA
	4th International Conference on Pediatrics	March 29-31, 2016, Atlanta, USA
May	Saudi Health 2016	16 - 18 May 2016, Riyadh, KSA

GUIDELINES FOR MANUSCRIPT PREPARATION

A. TYPES OF MANUSCRIPTS

I. ORIGINAL MANUSCRIPTS

Manuscripts submitted in this category are expected to be concise, well organized, and clearly written.
The maximum length is 5000 words, including the abstract, references, tables, and figure legends. The maximum length is 5000 words, including the abstract, references, tables, and figure legends.

- The structured abstract must not exceed 250 words.
- The title must not exceed 130 characters.
- A maximum of 4 tables and 4 figures is allowed.
- References should not exceed a maximum of 100.
- The abstract must be organized as follows:
- Background & Aims
- Methods
- Results
- Conclusions
- Do not use abbreviations, footnotes or references in the abstract.
- An electronic word count of the abstract must be included.
- Three to ten key words at the end of the abstract must be provided.

The manuscript must be arranged as follows:

- Title page
- Abstract
- Introduction
- Materials and methods (or Patients and methods)
- Results
- Discussion
- Acknowledgements
- References
- Tables
- Figure legends
- Figures

Acceptance of original manuscripts will be based upon originality and importance of the investigation. These manuscripts are reviewed by the Editors and, in the majority of cases, by two experts in the field. Manuscripts requiring extensive revision will be at a disadvantage for publication and will be rejected. Authors shall be responsible for the quality of language and style and are strongly advised against submitting a manuscript which is not written in grammatically correct English. The Editors reserve the right to reject poorly written manuscripts even if their scientific content is qualitatively suitable for publication. Manuscripts are submitted with the understanding that they are original contributions and do not contain data that have been published elsewhere or are under consideration by another journal.

II. REVIEW ARTICLES

Review articles on selected clinical and basic topics of interest for the readers of the Majmaah Journal of Health Science will be solicited by the Editors. Review articles are expected to be clear, concise and updated.

- The maximum length is 5000 words, excluding the summary, references, tables, and figures.
- References should not exceed a maximum of 150.
- The inclusion of a maximum of 4 high-quality tables and 4 colored figures to summarize critical points is highly desirable.
- Review articles must be accompanied by a title page and a summary.

- Reviews should include at least one Key Point Box, with a maximum of 5 bullet points, that briefly summarizes the content of the review.

Review articles are reviewed by the Editors and may be sent to outside expert reviewers before a final decision for publication is made. Revisions may be required.

III. EDITORIALS

This section consists of invited brief editorial comments on articles published in the Majmaah Journal of Health Science

The length of an editorial should not exceed 1500 words, excluding references.

- A maximum of 1 table or 1 figure is allowed.
- References should not exceed a maximum of 20.
- A title page must be provided.

IV. CASE REPORTS

Case reports would be only accepted if they represent an outstanding contribution to the Etiology, pathogenesis or treatment of a specific condition.

- The maximum length is 3000 words, including the summary and references.
- A maximum of 2 tables and 2 figures is allowed.
- References should not exceed a maximum of 15.
- A title page must be provided.

V. LETTERS TO THE EDITOR

Letters to the Editor will be considered for publication if they are related to articles published in recent issues of Majmaah Journal of Health Science. Occasionally, Letters to the Editor that refer to articles not published in Majmaah Journal of Health Science will be considered.

The length of a Letter to the Editor should not exceed 800 words.

- A maximum of 1 table or 1 figure is allowed.
- References should not exceed a maximum of 10.
- No more than 4 Authors may appear in the author list.

VI. COMMENTARIES

International commentaries will be solicited by the Editors only.

- Commentary articles should not exceed a maximum of 800 words, excluding tables or figures.
- A maximum of 1 table or 1 figure is allowed.
- References should not exceed a maximum of 10.
- A title page must be provided.

B. MANUSCRIPT SUBMISSION

ORGANIZATION OF THE MANUSCRIPT

- The submitted manuscript must be typed double-spaced throughout and numbered (including references, tables and figure legends). Preferably using a "standard" font (we prefer Times/Arial 12).
- For mathematical symbols, Greek letters, and other special characters, use normal text. The references must be in accordance with the Vancouver reference style (see References).
- Approved nomenclature for gene and protein names and symbols should be used, including appropriate use of italics (all gene symbols and loci, should be in italics) and capitalization as it applies for each organism's standard nomenclature format, in text, tables, and figures.
- Full gene names are generally not in italics and Greek symbols are not used. Proteins should not be italicized.
- Improperly prepared manuscripts will not be entered into the peer review process and will be sent back to the author for correction.

TITLE PAGE MUST CONTAIN:

- A title of no more than 130 characters.

- Running title (not to exceed 60 characters)
- Names of the Authors as it should be published (first name, middle initial, last name)
- Affiliations of all authors and their institutions, departments, or organizations (use the following symbols in this order to designate authors' affiliations: *, †, ‡, §, ¶, ||, #, **, ††, ‡‡, §§, ¶¶, || ||, ##).
- Name, address, telephone and fax numbers, and electronic mail address of the corresponding Author.
- Electronic word count.
- Number of figures and tables.
- List of abbreviations in the order of appearance.
- Conflict of interest.
- Financial support.

Animal trials: Manuscripts reporting experiments using animals must include a statement giving assurance that all animals received human care and that study protocols comply with the institution's guidelines. Statistical methods used should be outlined.

Human trials: Manuscripts reporting data from research conducted on humans must include a statement of assurance in the methods section of the manuscript reading that:

1. Informed consent was obtained from each patient included in the study and
2. The study protocol conforms to the ethical guidelines of the 1975 declaration of helsinki as reflected in a priori approval by the institution's human research committee.

Randomized controlled trials: Any paper that is a randomized control trial should adhere to the guidelines that can be found at the following web-site: www.consort-statement.org. The checklist should be printed out and faxed to the Editorial office at the time of submission. The trial registration number must be included on the title page of the manuscript reporting a registered clinical trial. Failure to do so will prevent entry to the peer review process.

Drugs and chemicals: Drugs and chemicals should be used by generic name. If trademarks are mentioned, the manufacturer's name and city should be given. All funding sources supporting the work, either public or private, especially those from pharmaceutical companies, must be provided.

Genetic Sequence data: In papers reporting a novel DNA or amino sequence, verification that the data have been or will be submitted either to Gen-Bank or EMBL is required. Please provide this verification and the accession number in the covering letter.

REFERENCES

References must be in accordance with the Journal of Hepatology reference style. References are ordered as they appear in the text and citation numbers for references are placed between "brackets" ("[ ]") in the text as well as in the reference list.

Authors should be listed surname first, followed by the initials of given names (e.g. Bolognesi M). If there are more than six authors, the names of the first six authors followed by et al. should appear.
Titles of all cited articles are required. Titles of articles cited in reference list should be in upright, not italic text; the first word of the title is capitalized, the title written exactly as it appears in the work cited, ending with a full stop. Journal titles are abbreviated according to common usage, followed by Journal years, semicolon (;) before volume and colon (:) before full page range (see examples below).

All articles in the list of references should be cited in the text and, conversely, all references cited in the text must be included in the list.

Personal communications and unpublished data should be cited directly in the text by the first Author, without being numbered. Please make sure you have the latest, updated version of your reference management software to make sure you have the correct reference format for Majmaah Journal of Health Science.

An example of how references should look within the text:

"HVPG was measured by hepatic vein catheterization using a balloon catheter according to a procedure described elsewhere [14, 15] and used as an index of portal hypertension [16]."

An example of how the reference list should look:

[14] Merkel C, Bolognesi M, Bellon S, Zuin R, Noventa F, Finucci G, et al. Prognostic usefulness of hepatic vein catheterization in patients with cirrhosis and esophageal varices. Gastroenterology 1992;102:973-979.
[15] Groszmann RJ, Wongcharatrawee S. The hepatic venous pressure gradient: anything worth doing should be done right. Hepatology 2004;39:280-282.

FIGURES

A maximum of 4 figures is allowed
(This can be modified if needed by Editorial board).

- Figures will be often, but not always, re-designed by graphic designers. By signing and transferring the Copyright Agreement to MJHS, the author gives permission to the graphic designers to alter the visual aspect of any figures, tables, or graphs. The scientific content of figures will not be altered. Please provide this information with your covering letter.
- All graphics submitted to Majmaah Journal of Health Science should be sent at their actual size, which is 100% of their print dimension and in portrait orientation.
- Two standard widths are used and figures should fit in one (8.5 x 23.5 cm) or two (17.5 x 23.5 cm) columns
- Figures should be supplied in the following preferred file formats: PDF (*.pdf), Power Point (*.ppt), Adobe Illustrator (*.ai, *.eps), Photoshop (*.psd) files in grayscales or in RGB color mode. It is highly recommended that figures not be sent in JPG (*.jpg) format.
- Photographs (scans, immunofluorescences, EM, and histology images) should be submitted as: 1. TIFF (*.tif) with a resolution of at least 300 pixels per inch, or
- Illustrator compatible EPS files with RGB color management (*.eps),
- Photoshop (*.psd) or PDF (*.pdf) files (grayscales or RGB) at the appropriate resolution, which is:

1. 300 dpi for color figures
2. 600 dpi for black and white figures
3. 1200 dpi for line-art figures

- For all photomicrographs, where possible, a scale should appear on the photograph. Photographs of identifiable patients should be accompanied by written permission to publish from patient(s).
- • Furthermore, panel lettering should be in Arial bold 14 pt, capitalized and no full stop (A, B) while lettering in figures (axes, conditions), should be in Arial 8 pt, lower case type with the first letter capitalized and no full stop. No type should be smaller than 6 pt.

TABLES

A maximum of 4 tables is allowed
(This can be modified if needed by Editorial board)

- Tables should be provided as Word files (*.doc) or Illustrator/InDesign (*.ai, *.eps, *.indd) compatible files. No TIFF and JPG files are acceptable for table submission.
- When submitting tables in Microsoft Word table function, no tab, space or colors should be used. Tables should contain a maximum of 10 columns.
- Tables submitted in landscape orientation will not be accepted. Tables should include a title, table legend, and if necessary footnotes.
- Include tables in the submitted manuscript as a separate section.

FIGURE LEGENDS

- Figure legends should be listed one after the other, as part of the text document, separate from the figure files.
- Please do not write a legend below each figure. Each figure legend should have a brief title that describes the entire figure without citing specific panels, followed by a description of each panel, and the symbols used.
- Enough information should be provided in the figure legend text to permit interpretation of figures without reference to the text; but should not contain any details of methods, or exceed 100 words.
- The abbreviated word for figure "Fig." should be typed and bolded, followed by the figure number and a period

(i.e. "Fig. 1."). Every figure legend should have a Title written in bold.
- If a figure contains multiple sections (i.e. A, B, C, D) the letter for these subsections should be in capital letters. Within the figure legend text the capital letters should be surrounded by parenthesis [i.e. (A)(B)(C)(D)].
- Figures should be numbered according to the order of citation.

Supplementary material: Supplementary material, not for review, is acceptable. Supplementary material can be submitted as (*.mov), (*.avi), (*.mpeg), or (*.gif) files. Please note that the size limit for these items is 10 MB per file.

ENGLISH

Authors may be asked to contact professionals regarding the correction of the English content of manuscripts either before or after acceptance. This expense will be the responsibility of the Authors.

C. REVIEW PROCESS

Authors should be aware that manuscripts will be screened upon submission. Only the manuscripts which fully comply with the submission requirements outlined and in which the level of English is of an acceptable standard will enter the peer review process.

First submission

Once successful submission of a manuscript has taken place, an acknowledgement will be sent by e-mail to the Corresponding Author on the manuscript. All subsequent correspondence will be with the designated Corresponding Author. The number of the manuscript should be used by the Authors in all communications with the Editorial Office. All the manuscripts will be reviewed by the Editors and, and in some cases, by other expert reviewers. After review, the corresponding Author will be notified by letter of the decision taken by the Editor(s). This letter will be accompanied in most, but not all, cases by the comments of the reviewers. This letter will be sent via e-mail.

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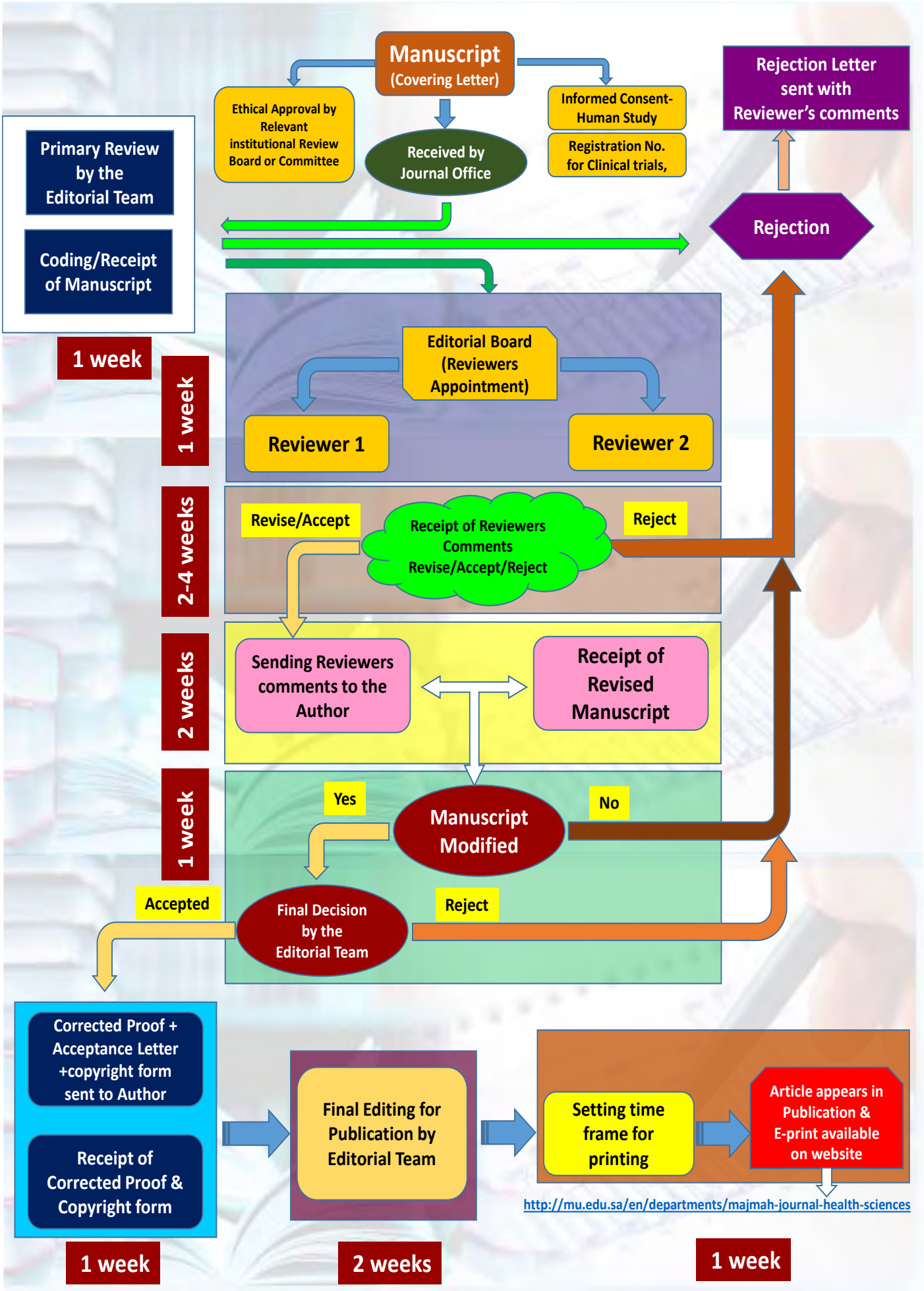
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