

## CHAPTER 11

### MEDICAL CONDITIONS IN THE WESTERN DESERT AND TOBRUK

CONSIDERATION of the medical and surgical conditions encountered by Australian forces in the campaign of 1940-1941 in the Western Desert and during the siege of Tobruk embraces the various diseases met and the nature of surgical work performed. In addition it must include some assessment of the general health of the men, which does not mean merely the absence of demonstrable disease. Matters relating to organisation are more appropriately dealt with in a later chapter in which the lessons of the experiences in the Middle East are examined. As told in Chapter 7, the forward surgical work was done in a main dressing station during the battles of Bardia and Tobruk. It is admitted that a serious difficulty of this arrangement was that men had to be held for some time in the M.D.S., which put a brake on the movements of the field ambulance, especially as only the most severely wounded men were operated on in the M.D.S. as a rule, the others being sent to a casualty clearing station at least 150 miles away. Dispersal of the tents multiplied the work of the staff considerably.

#### *SURGICAL CONDITIONS IN THE DESERT*

Though battle casualties were not numerous, the value of being able to deal with varied types of wounds was apparent. In the Bardia and Tobruk actions abdominal wounds were few. Major J. O. Smith had emphasised features which were found of the utmost importance in later campaigns, in particular the degree of blood loss common in these injuries, and the frequent association of severe injuries of the abdominal viscera with wounds of entry in unusual places. The source of bleeding was difficult to discover, more important was the search for perforations of the bowel, which were easy to find. In the 2/1st C.C.S. at Mersa Matruh 352 battle casualties were treated: of these only three had penetrating wounds of the abdomen, six penetrating wounds of the thorax, three head injuries; the remainder of injuries in these regions were superficial only. By contrast, there were 249 wounds of limbs, including fractures and those requiring amputation. The shortest period between wounding and arrival at the C.C.S. was thirty-six hours, the longest four days: of course all these patients had received prompt treatment forward. Most of them showed considerable degrees of shock, due to the long trying journey on a bad road. Through and through bullet wounds gave trouble only when they had been plugged with gauze: fortunately this was seldom done. Grenade wounds were seldom serious, unless they involved the eyes. Lacerated wounds usually did well after adequate early treatment. Very few amputations were necessary; they did well if the flaps were loosely approximated. Haemothorax was found in all the chest wounds; some had attained

stabilisation. Though few abdominal wounds were seen it is significant that all the patients were shocked on arrival, and all suffered from ileus. Thus early was it established in this campaign of long distances that men with penetrating wounds of the abdomen travelled badly. Compound fractures constituted a major problem. The long journey by ambulance was a nightmare to these men, and, owing to the fact that fixed extension by a hitch round the boot had usually been employed, pressure sores were common. The men treated with plaster over voluminous dressings were relatively comfortable: this was also noted at the 2/2nd A.G.H. at Kantara. The necessity for immobilisation of fractures was thus stressed at the beginning of this campaign.

The practical detail of washing and feeding all patients as soon as possible after arrival, and, if practicable, shaving them also, was found most important. The frequency of wounds of the lower limbs in the desert had been expected, owing mainly to the prevalence of mines and booby traps, whose firing mechanism was usually well concealed. The "thermos" bomb, so called from its shape, contained a cap and detonator powerful enough to damage limbs, and its explosive charge was effective up to 100 yards, large fragments often flying up to 300 yards. The freedom from infection of wounds received in the desert has already been remarked: no clinical gas gangrene was seen. Major E. S. J. King's observation may again be noted here, that some of the wounds of Italian prisoners which had had practically no treatment remained uninfected.

The technical experience at Bardia was repeated during the battle of Tobruk, but here the period was shorter and the medical preparations more extensive, so that fewer difficulties were encountered. As the forces rushed forward to Benghazi and beyond, there was, fortunately, less urgent surgery to be done. A point of importance remarked by Colonel Johnston, D.D.M.S., 1 Australian Corps, was that the casualties in Cyrenaica were serious in nature rather than numerous, and were due chiefly to the growing air attacks, mainly dive-bombing and machine-gunning from *Messerschmitts*, and spasmodic attacks of armoured vehicles on forward posts. Blood transfusion in these dispersed actions was carried out successfully without a centralised organisation, largely owing to the policy of General Burston that all forward medical officers should be expert in this work, and to the influence and teaching of Major Ian Wood. In the 2/4th A.G.H. in Tobruk blood was stored in an ice chest; some trouble was experienced with contamination of citrate tablets by the *subtilis* group, and great care was necessary to avoid this, as there was lack of running water to wash glassware. Minor technical defects in the apparatus could cause air-borne contamination, but in spite of unfavourable surroundings and limited facilities, the use of blood transfusion was not hampered. The Julian Smith direct transfusion apparatus was used with success in suitable cases. Similarly there was a feeling that anaesthesia was best left to people on the spot, under supervision of a surgical team, and that the specialist anaesthetists were of most value in general hospitals. The value of a skilled anaesthetist was of course fully appreciated.

Early in 1941 a conference was held at which surgical representatives of British and Dominion forces were present; at this the main problems concerning treatment of surgical conditions were discussed. There was general agreement that the most important matters were the provision of early surgical treatment for all wounded, and special facilities for the treatment of orthopaedic conditions, wounds of the head and the chest and facio-maxillary injuries. The latter were provided at special centres to which men were transferred when fit to travel. Concerning early treatment, no panacea could then be offered for those wounds needing prompt operation which, particularly in abdominal injuries, demanded that the patient should be held for some days. Since no general principles could be laid down it was apparent that prevailing conditions must be a deciding factor. Mobile surgical units were discussed, but weak points were recognised in the need of transport in a place and at a time when all transport was scarce, and also in the depletion of skilled surgical staff from base units just when their need was greatest.

#### SURGERY IN TOBRUK

Medical and surgical conditions during the siege of Tobruk differed from those prevailing elsewhere. The 2/4th A.G.H. though working under conditions of strain, was adequately equipped for most types of surgical work. The majority of surgical cases reached hospital within six hours of wounding; some of the men with urgent conditions, including abdominal injuries, arrived even earlier. Patients with abdominal wounds usually recovered if they survived long enough to be sent to the base. As the months went by in Tobruk results from abdominal wounds deteriorated, owing possibly to a greater dehydration of patients, before being wounded, and to lessened resistance from general causes. Chest wounds were relatively common, and the principle was established that the pleural cavity should be kept dry. It was often noticed that some fever occurred during the second week; this was thought to be due to infection round a foreign body, and was regarded as an indication for surgery, but further deliberate procedures were not carried out in Tobruk. Collapse of the lung *per se* did not foreshadow a bad prognosis; it was better to find air than blood in the pleural cavity. Injuries of the upper lobe did better than wounds of the lower lobe, owing to the greater ease with which rest and drainage were obtained.

Burns were fairly frequent of occurrence, and usually of second degree. An occasional cause of burns was the incautious use of petrol. Men sometimes wet a flea-infested dug-out with petrol and threw in a match, a practice which often had serious results. Tanning with tannic acid and silver nitrate had good results on the whole, provided the usual precautions were taken on special sites, but patients with burns often arrived at the base in poor condition. This was attributed to a need of further skilled treatment at the time of evacuation, a condition hard to fulfil in Tobruk.

Injuries of the limbs were some of the most important treated there, on account of the problems arising in transport, especially when the wound involved long bones of the larger joints. Fractures of the femur raised all the usual problems. Thomas splints were regarded as ideal for transport from the aid post to the main dressing station or C.C.S., but some of the splints supplied were faulty in the design of the ring, which was often nearly circular and did not have the correct perineal depression. Adequate support of the back of the thigh was sometimes lacking. Extension with the use of a clove hitch was found unsuitable and uncomfortable: a bandage threaded through the slit boot was found useful. Warnings were given of the risks of packing under the ring of the splint over the femoral triangle. The commonest fault in the application of Thomas splints at aid posts was neglect of suspension, which caused angulation of the femur. At the 2/4th A.G.H. full advantage was taken of the facilities which existed for plastering, and the "Tobruk plaster" and its modifications adopted there met the need for immobilisation. The Tobruk plaster was simply a full plaster case incorporating a Thomas splint without extension. If the Thomas splint did not fit well a plaster spica was found preferable, in spite of difficulties in applying it and the possibility of pressure sores. Shoulders were at first treated with a plaster shell over the shoulder and under the arm, with the latter secured to the side, but later, after further experience, a spica was used with the arm abducted to 40 degrees. It was indeed some time before the lesson was learnt that such injuries call for methods that will be effective under the worst conditions of transportation. During the period April to September 1941, eighty-seven major amputations were performed in Tobruk, most of them immediate. The usual practice was followed of making flaps equal to the diameter of the limb. Sutures were inserted at only one or two points and nerves were not shortened or tied. Most of the wounds healed without serious sepsis.

Some extemporisation was necessary: in July a survey of the surgical equipment of the 2/2nd C.C.S. showed deficiencies, especially in heavier items, but these were made good from stocks of captured instruments, and a foot suction pump and a Bohler traction frame were devised by the ordnance workshops.

Considerable mortality followed wounds of the head, the death rate was 50 per cent where penetration of the dura had occurred. In consonance with usual experience, the degree of loss of consciousness was found a good guide to the seriousness of a head wound. Sometimes the cause of death was obscure; in some instances it was thought possibly to be due to microscopic damage to the brain, particularly in the basal part.

*Dental Conditions.* Major A. B. P. Amies made a special report on all dental conditions encountered in Cyrenaica and Tobruk. He found many men were completely edentulous; some of them had been without dentures for as long as nine months, and though many complained of indigestion others were quite fit. The gums were usually healthy. The incidence of caries was not great; it appeared to be somewhat less than might be expected in a similar body of men under ordinary conditions. Amies

noted a number of men with impacted teeth, and suggested that men with these conditions should not be sent into forward areas, but Colonel Down, A.D.M.S., Dental, doubted the validity of this view, and also pointed out that there were not many edentulous men in the 6th Division, as only 50 had been observed out of 1,350 to have full dentures. Fractures of the lower jaw were not easy to control during the journey from Tobruk to Egypt. Amies reported that some men arrived at the base with wiring loose or even unfastened, but nevertheless, he recommended that wiring should be applied loosely in the interest of safety, as sea sickness was a genuine hazard on a small ship where close attention was difficult to give to individual patients.

*Anaesthetics* of the usual type were used. As pointed out elsewhere, ether was of general utility, and "Pentothal" was found of particular value in Tobruk, due regard being paid to the precautions for securing a free airway. Gas anaesthetics were used to some extent too, but difficulty was found in obtaining gas cylinders of the Australian type, as those in the store were of British type. Major Trethowan, on an official visit to the area, suggested that adaptors could be made to overcome this.

*Affections of the ear, nose and throat* were not common. Perforations of the ear drum from blast were relatively common in all the actions in Libya and Cyrenaica; they were often bilateral, and occasionally multiple, and their size sometimes prevented complete healing. Hearing was not usually much impaired. *Otitis externa* was not uncommonly seen in Tobruk; it was only satisfactorily treated in hospital.

*Eye injuries* have been already mentioned in the previous chapter. They were usually an indication for return of the patients to Egypt. Though a giant magnet was among the equipment in Tobruk it was useless, for although most of the injuries were due to metallic particles, these were usually non-magnetic. Trachoma was almost universal in the native troops, but was not seen in others. Night blindness was seldom proved to exist. Conjunctivitis was remarkably uncommon, in spite of dust and glare and paucity of convenience for washing. Refractions were carried out in Tobruk; over 300 prescriptions for glasses were sent to Egypt, but only 67 pairs of glasses materialised.

"*Desert*" sores were not infrequent among the forces in Libya and Cyrenaica and they appeared in proportion to the lack of washing facilities especially after several months. In Tobruk infections of the areolar tissue were often seen, sometimes associated with fever and involvement of the lymphatic glands. These lesions would no longer respond to occlusive dressings. Dermatological conditions other than those of minor grade as a rule did not lend themselves to treatment except in base areas. Scabies needed some degree of control in Tobruk. This applied particularly to prisoners of war, but the conditions of living in the line might easily have favoured parasitic infestations, and disinfestors were installed and used where necessary.

Swimming was of course a pleasant and most useful prophylactic amenity for men out of the line for rest, but the difficulty was one of

distance. In Tobruk the privilege was curtailed during the later months by reason of petrol shortage. An interesting link with the past is the name "Anzac Cove", which was given to a beach where occasionally men swam in the evenings.

Analysis of the battle casualties showed the following figures during 1940-1941:

Campaign	Killed in Action	Died of Wounds	Total	Wounded	Missing	PW	Full Total
<i>Libya</i> 19th Dec 1940- 31st Mar 1941	209	59	268	932	—	24	1224
<i>Cyrenaica and Tobruk</i> (retirement and siege) 1st Apr 1941- 18th Nov 1941	567	199	766	2057	4	973	3800

#### MEDICAL CONDITIONS

The medical diseases most frequently encountered in the Western Desert and in Tobruk were important from the preventive aspect, as most of them could be reduced in incidence by appropriate measures, without which greater depletions of the force might have occurred.

*Dysentery* was the most obvious danger, particularly when the approach of warmer weather brought an increase in the fly population. As has been pointed out already, the conditions of dispersal in the desert, and the scarcity of wood and other material for construction of latrines where the nature of the soil made this possible, militated against a high sanitary standard in some respects. Colonel Johnston commented on the unsatisfactory hygiene in places where it was difficult to enforce. Fortunately, however, sickness from this cause was neither extensive nor severe, and, as we have seen, when the 9th Division was concentrated in Tobruk, the intrinsic dangers of large numbers of mixed races living in a restricted area were offset by the hard and persistent work of the hygiene services, and no severe epidemic occurred. The introduction and supplying of a latrine box to forward areas by Major Fryberg and his hygiene staff was of great prophylactic value. Nevertheless, both in the desert and in Tobruk the risks of dysentery were increased by the presence of a large population of native labourers and inhabitants, and of many prisoners of war, all of whom were potential carriers. Major Mackerras in a study of the fly problem in the desert noted that flies were numerous even early in the year, and so persistent that it was very hard to exclude them from food and drink. A desert fly, *Musca sorbens* had habits as noxious as those of the domestic housefly, and by April was increasing rapidly. Mackerras recommended that an officer with knowledge, facilities and assistance

needed for entomological and bacteriological work should study the whole problem from the point of view of prophylaxis. He further recommended that all men with presumed dysentery should be detached from the fighting force, that all refuse be incinerated if possible, or dug in daily, and that borax or other insecticide be sprinkled on the site and other possible breeding grounds, and that excreta should be incinerated if possible, and all appliances be rendered fly proof. Special precautions were necessary in cookhouses, and disinfectants were provided for cleaning the hands of those preparing food. Finally, native labourers required special care, and local inhabitants should not be allowed to return to territory likely to be occupied by troops. Figures collected by Major Blair of the XIII Corps are of interest. He found the weekly rates for dysentery to vary with the nature and mobility of troop formations, as follows: Armoured division 0.46 per 1,000; stationary troops in Matruh fortress with many natives near, 0.51 per 1,000; N.Z. brigade groups, well dispersed in stationary position, 0.73 per 1,000; corps troops in small units with no permanent supervision, 3.0 per 1,000; British troops in motorised division, mostly separate, but with little experience in hygiene, 3.3 per 1,000; and Indian troops with poor hygiene, 5.4 per 1,000.

Dispersion, tightened control, the adoption of better individual methods, and, later, rapid movement were probable factors in keeping dysentery in bounds during the open campaigning in the desert. In Tobruk the application of sound methods and constant supervision, and the placing of responsibility on the units themselves reduced fly breeding, and kept dysenteric disorders within bounds. A factor of great educative value was the close personal supervision of unit hygiene by experienced N.C.Os. from the 2/4th Field Hygiene Section, who lived for periods with the troops in forward posts.

Of all the infectious diseases notified for the whole of the troops in Tobruk during the period from April to October by far the greatest number were due to diarrhoeal infections; 1,106 cases were notified under the categories of dysentery, diarrhoea and enteritis. Most of the infections were of Flexner type, with only a few of the Shiga variety; toxic symptoms were seldom severe. In some patients with clinical dysentery no organisms were demonstrable. Water was not usually suspected as a source of dysentery in Tobruk, but some cases were thought to follow the drinking of good water collected in dirty water-bottles. It was considered that many mild infections were transmitted by handling contaminated food. Most of the hospital staff were affected with mild attacks at one time, but compulsory washing in antiseptic lotion before handling food was found effective as a preventive. Sulphaguanidine was available only in limited quantities in Tobruk for part of the time, but proved of value, especially in shortening the course of the disease.

Amoebiasis was not a significant problem during these campaigns: no doubt, as in other areas, stealthy infections sometimes occurred, which became manifest at a later date.

## FEBRILE DISEASES

The incidence of infective hepatitis began to increase in the later months in Tobruk, and caused considerable loss of time from duty. Little was known in 1941 with any certainty about this infection. Some medical officers had a suspicion, confirmed later, as we now know, that it was epidemiologically of the intestinal group of infections, but others clung to the hypothesis of spread from the respiratory tract. As there is no doubt a good deal still to be added to knowledge of its natural history, there is little more that can be said here. One other point is, however, dealt with further in connection with causes of obscure pyrexia. It is worth noting that in the more severely affected patients, with acute onset of symptoms, neck rigidity was not uncommon.

*Relapsing fever* was another problem to be dealt with in Tobruk. The disease as seen in the desert was of the same type as seen in Palestine and Syria; it was transmitted by ticks, apparently of the *Ixodes* variety. The louse-borne variety was not seen. Lieut-Colonel E. L. Cooper investigated the disease clinically in Tobruk and Major G. V. Rudd carried out the pathological diagnostic work. It is likely that, in spite of careful and skilful investigations, a diagnosis was not always possible during the time available. In the following months men were occasionally seen in general hospitals in Palestine with neurological complications of relapsing fever which had not been previously recognised. The spirochaete is not easy to demonstrate, and sometimes can be found only by special methods, such as animal inoculation. The history is often misleading too, as it is not at all obvious to the victim that he has been bitten by adult or larval ticks. Prophylaxis was difficult both in the desert and in Tobruk, where the haunts of the ticks, such as dug-outs, tunnels, caves and crevices in rocks were just the places where men sheltered and even lived. As was found in other centres, arsenic did not give striking results in treatment.

*Undetermined Pyrexias.* In Tobruk there were large numbers of cases seen of pyrexial illness for which no sure explanation could be given. There was little opportunity for elucidating pyrexial diseases except in medical units able to hold patients for some length of time. This general question has been discussed already. In Tobruk the nature of these infections seemed to change as time went on. In May the illness resembled sandfly fever or dengue fever. Rashes were rare, and the duration was brief, though the toxic symptoms caused considerable temporary disturbance. Frontal headache was common, also occipital or sub-occipital pain, pain behind the eyes with tenderness of the eyeballs, and aching of the back and limbs. Lumbar puncture relieved the headache. It has been repeatedly stated that no sandflies or mosquitoes of the *Aedes* type were found in areas in which the disease appeared. Sandflies were certainly not absent from their characteristic haunts, though their numbers might not have been great; at Mersa Matruh the *phlebotomus* was recognised after careful search. Colonel S. Smith, British Consultant in Tropical Diseases, on visiting Tobruk, pointed out that it was highly probable that sandflies



were present there, even though they had not been detected, just as had happened in Matruh.

Another possible cause of confusion in diagnosis was infective hepatitis. An acute febrile onset was not infrequent, with a latent period before jaundice appeared; there was also a non-icteric variety of the disease. An even more important suggestion was that some of these fevers might be a variety of typhus fever. Rudd investigated this possibility, but could not demonstrate agglutination of the *Proteus* OXK, OX2 or OX19 at diagnostic levels. The 6th Mobile Bacteriological Laboratory reported finding immunological evidence that there was a variety of typhus in Tobruk thought to be of the murine type. Agglutination of *B. proteus* OXK, but not of OX19 or OX2 was found; this was not confirmed by other tests in the 2/4th A.G.H. Rudd found no organisms grew from blood cultures from these patients; the only abnormality on routine blood examination was some degree of lymphocytosis. It would not be surprising if cases of mild typhus were carried in Tobruk by an insect vector, either a flea or a tick. Subsequent work in other areas showed that a considerable amount of critical work was necessary to establish this diagnosis, and though pathological facilities were good in Tobruk, the opportunity for prolonged serial investigation was not great.

After some months the predominant nature of the common undetermined fevers changed: the upper respiratory tract was frequently affected, and a number of patients were seen with broncho-pneumonia. It is possible that some of these may have been due to the so-called "atypical" virus pneumonia, but this is merely an unconfirmed suggestion. With constant traffic in and out with reinforcements and patients it is possible that some new infection was introduced, such as the common "Urti" of military camps.

In some areas, particularly among the prisoners of war at Tobruk, fever and sweating were common, associated with pain in the muscles and joints severe enough to suggest a rheumatic affection. Some of these attacks were probably of the common variety described in Tobruk, but it is possible that others may have been more akin to conditions more or less vaguely described as "rheumatic". In January 1941 fever, malaise and joint pains were observed in a number of Australian soldiers; three were seen in one week in the 2/2nd Battalion. These attacks were associated with localised symptoms in one of the larger joints, which was usually hot and swollen. They were not related to the familiar bouts of "fibrositis" which may follow exposure to cold and exertion.

Malaria was only seen in a few instances among the forces in the desert: it was not endemic in the areas under consideration.

#### PSYCHIATRY

The only other important medical conditions belonged to the psychiatry group of disturbances. There are some local factors of importance which merit further consideration here. Physical exhaustion did not play so important a part in Tobruk as other factors, such as the existence of a

poor emotional background, illness, the consciousness of the lack of air support, and the non-success of the campaign from Egypt. To these must be added worry of domestic origin and lack of regular letters from home. Though acute exhaustion did not often play a dominant part in Tobruk, this did occur as a precipitating event. It was then rather the culminating crisis of a long period of fear-producing stimuli and lack of rest that produced the breakdown. Dive-bombing was a definite exciting cause, especially as retaliation in the air by fighters was not possible. This was seen particularly in anti-aircraft batteries where men broke down suddenly after prolonged exposure to such attacks. In these units the common primary reaction seen was exhaustion though some of the men also showed hysterical abreaction, running and calling out. A secondary reaction was more often seen in men with previous neuropathic tendencies. The acute states usually gave a better prognosis. It was noted that the neurotic conditions of more gradual onset occasionally became manifest while the man was under treatment in hospital, for more or less minor affections, such as mild dysentery. The percentages affected in the various units are of interest estimated over a period of three months. Infantry battalions averaged 1.13 per cent, the extremes ranging from 3 per cent in one battalion, 2.7 and 2.1 per cent in others, down to 0.2 per cent. Artillery units averaged 1.4 per cent, anti-tank companies 2.5 to 1.1 per cent. Among the 9th Division A.A.S.C. the average was 0.6 per cent, and in the 9th Division H.Q. 0.5 per cent. Anti-aircraft units, however, averaged 2.3 per cent, ranging from 9.1 per cent in one heavy unit to 3.4 per cent in one light unit, down to 0.4 per cent in others. The results of treatment were good, and many men were successfully returned to their units. R.M.Os. were instructed to hold some of the men with fear states in the R.A.P. areas, in a dug-out where they could feel reasonably comfortable and safe. Here they were fed as well as possible and given sedatives. Many men recovered after a good sleep and returned to the line. The work of the R.M.Os. in this field of preventive psychiatry described in the previous chapter was of a high order, and contributed notably to the morale of the force. When numbers were large the M.D.S. of the 2/3rd Field Ambulance was used to sort out the men, and many men recovered here too without being sent to hospital. The medical section of the 2/4th A.G.H. used a deep ready-made concrete cavern as a special safe shelter, and much successful work was carried out there.

One important prophylactic measure became evident after a time in Tobruk. This was the importance of eradicating men of a poor psychological type from forward units. There were many who were known to be really unsuitable for the regions of hazardous soldiering, and they later had to be returned as "NYDN". Admittedly it was a difficult problem to get rid of such men: combatant units always tend to look to the medical services to help them out.

Self-inflicted wounds also call for some further mention. Major Ackland reported that during the middle period of the siege these wounds were "alarmingly common". During several weeks in July almost half the

admissions to the 2/4th A.G.H. were of this type. At this time direct evacuation to Alexandria was the custom. Later, these men were kept in a ward holding about thirty, which was not in the safer beach section; they consisted of British, Australian and Polish troops. The numbers decreased thereafter, though news of the relief of the 9th Division was then to hand. Courts martial were held only if the evidence warranted such action.

#### GENERAL HEALTH IN THE DESERT

Descriptions of medical and surgical disabilities tend to lay emphasis on the minority who suffer from declared ill health. The health of a force may be judged not only by its sickness rates, but by its general well-being, alertness, endurance and capacity to accomplish the tasks set out. By these standards the Australian forces in the desert were healthy. Their rations were good on the whole, but a certain degree of monotony and the lack of enough fresh food were clearly discernible during the later months. Disher noted the possibility of some lack of vitamins in the rations of the 6th Division; no fresh milk was available, and very little butter. Bottled fruit juice was not popular with the men. In some of the settled areas where sea transport was possible, fresh meat and vegetables were obtainable occasionally, and efforts were made in Tobruk to supply fresh food when possible. Ice was obtainable in Tobruk and refrigeration was installed in the docks area, so that fresh meat could be kept on the occasions when it reached Tobruk. Furnell summarised the dietary deficiencies in this area as (1) lack of fresh vegetables and fruit, countered by the daily issue of ascorbic acid tablets, (2) lack of vitamin *B* complex, met by issue of "Marmite", and the use of 25 per cent Atta flour in making bread, and (3) lack of vitamin *A*, supplied by the use of English margarine when obtainable, which contained the necessary supplement, unlike the Australian margarine. Fresh fruit and vegetables were supplied when possible: for example 8 tons of onions arrived on a destroyer on one occasion, and in August the receipt of potatoes, marrows and citrus fruits gave welcome relief from monotony. The hazard of sea transport must be remembered; a number of supply ships were lost, and though a ninety days' supply was built up in Tobruk, the more perishable food could not be kept long. The desire for sweets and chocolates was noted early in 1941. Colonel Sproule, Director of Hygiene to the Middle East forces, advised that the Tobruk ration be reinforced by accessory foodstuffs, including cod liver oil, carrots, "Bemax", dried peas, and vitaminised margarine, but it was not found possible to supply these items except the last two.

In spite of hard living and some interludes of hard fighting, and exposure to risk and strain both the Australian divisions came through their trials in the Western Desert very well, and the chief aim of military medicine, prevention, was attained with a good measure of success.